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WDH
San Joaquin Valley Business Unit
Chevron North America
Exploration and Production
1546 China Grade Loop Road
Bakersfield, CA 93308

May 15, 2008

NPDES PERMIT NO. CA0082295
WDR ORDER #R5-2007-0170
TOXICITY TESTING

Mr. Dale Harvey
Senior Engineer
California Regional Water Quality Control Board - Fresno
1685 E Street
Fresno, Ca 93706-2020

Dear Mr. Harvey,

Enclosed you will find the Acute and Chronic Toxicity Report for Cawelo per NPDES Order No. R5-2007-0170, Permit No. CA0082295. As the report shows, there were significant chronic toxicity effects related to the test with Fathead minnows using the effluent discharge at EFF-001. There is also an indication that the test method needs to be reviewed, as it exhibited "PRM" or pathogen-related mortality. As we discussed, normally Chevron/Cawelo would have resampled once we saw the results, however, we are no longer discharging to Poso Creek and so toxicity testing is not required. We will run the toxicity tests again when we once again discharge into Poso Creek (EFF-003).

If you have any questions regarding the report, please contact Mr. Jim Waldron at (661) 654-7122.

Sincerely,


Gary J. Piron
Kern River Area Manager

MONITORING REPORT REVIEW

Engineer HA
Compliance Yes N no
Date Reviewed 8/11/08

Enclosure

cc: David Ansolabehere, Manager, Cawelo Water District

NPDES Compliance Acute and Chronic Toxicity Testing of the "EFF-001 Discharge" Effluent

Samples collected February 4, 2008

Prepared For:

Precision Analytical
321 19th Street
Bakersfield, CA 93301

Prepared By:

Pacific EcoRisk
2250 Cordelia Road
Fairfield, CA 94534

April 2008



PACIFIC ECORISK
ENVIRONMENTAL CONSULTING & TESTING

NPDES Compliance Acute and Chronic Toxicity Testing of the “EFF-001 Discharge” Effluent

Samples collected February 4, 2008

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1. INTRODUCTION

Precision Analytical has contracted Pacific EcoRisk (PER) to perform NPDES compliance evaluations of the acute and chronic toxicity of an effluent. These evaluations consist of performing the following US EPA freshwater acute and chronic toxicity tests:

- 96-hour acute survival test with fathead minnows;
- 96-hour algal growth test with the green alga *Selenastrum capricornutum*;
- 3-brood (6-8-day) survival and reproduction test with the crustacean *Ceriodaphnia dubia*; and
- 7-day survival and growth test with larval fathead minnows (*Pimephales promelas*).

This suite of freshwater acute and chronic toxicity tests was conducted on an effluent and receiving water sample collected on February 4, 2008. In order to assess the sensitivity of the test organisms to chronic toxic stress, reference toxicant tests were also performed. This report describes the performance and results of these effluent and reference toxicant tests.

2. TOXICITY TEST PROCEDURES

The methods used in conducting these tests followed the guidelines established by the EPA manual "Methods for Estimating the Acute Effects of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition" (EPA/821/R-02/012) and "Short-Term Methods for Estimating the Chronic Effects of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition" (EPA/600/4-91/002).

2.1 Sample Receipt and Handling

On February 4, Precision Analytical staff collected samples of effluent and receiving water into appropriately cleaned containers. These samples were transported, on ice and under chain-of-custody, to the PER laboratory in Fairfield. Upon receipt at the testing laboratory, aliquots of each sample were collected for analysis of initial water quality characteristics (Table 1), with the remainder of the samples being stored at 4°C except when being used to prepare test solutions. The chain-of-custody records for the collection and delivery of these samples are provided in Appendix A.

Table 1. Initial water quality characteristics of the effluent and receiving water samples.								
Date Received	Sample ID	Temp (°C)	pH	D.O. (mg/L)	Alkalinity (mg/L)	Hardness (mg/L)	Conductivity (µS/cm)	Total Ammonia (mg/L N)
2/4/07	RSW-001	19.9	7.90	13.8	90	90	266	<1.0
2/4/07	EFF-001	19.7	7.61	15.4	232	90	857	<1.0

2.2 Acute Toxicity Testing with Fathead Minnows

The fathead minnows used in this test were obtained from a commercial supplier (Aquatic Biosystems, Fort Collins, CO). These fish were maintained at 20°C in aerated aquaria containing EPA synthetic moderately-hard water prior to their use in this test. During this pre-test period, the fish were fed brine shrimp nauplii *ad libitum*.

The Lab Control water for this test consisted of EPA synthetic “moderately-hard” water, prepared by addition of reagent-grade chemicals to reverse-osmosis, de-ionized water. The receiving water (RSW-001) and the effluent sample (EFF-001) were tested at the 100% effluent concentration only. Water quality characteristics (pH, dissolved oxygen [D.O.], and conductivity) were determined for each test treatment test solution prior to use in this test.

There were two replicates for each test treatment, each replicate consisting of 400 mL of test solution in a 600-mL glass beaker. The test was initiated by randomly allocating 10 fathead minnows into each replicate beaker. The beakers were placed in a temperature-controlled room at 20°C under a 16L:8D photoperiod.

Each day, each replicate container was examined, and the number of live fish in each was recorded. Routine water quality characteristics (pH, D.O., and conductivity) of the treatment waters were measured and recorded for one randomly selected replicate per treatment each day.

On Day 2 of the 4-day test, fresh test solutions were prepared and characterized as before, and the fish were fed brine shrimp nauplii. Approximately 2 hrs after feeding, the number of live fish in each replicate was determined and then approximately 80% of the test media in each beaker was carefully poured out and replaced with fresh test solution, after which the “old” water quality characteristics (pH, D.O., and conductivity) were measured on the old test solution that had been discarded from one randomly-selected beaker at each treatment.

After 96 (± 2) hrs, the test was terminated and the number of live fish in each replicate beaker was determined. The resulting survival data were analyzed to evaluate any impairment due to the wastewater; all statistical analyses were performed using the CETIS® statistical software (Version 1.1.2revL, TidePool Scientific, McKinleyville, CA).

2.3 Algal Growth Toxicity Testing with *Selenastrum capricornutum*

The chronic algal toxicity test consists of a 96-hr bioassay in which the green alga *Selenastrum capricornutum* is exposed to effluent or receiving water and the effects on cellular reproduction determined. The specific procedures used in this test are described below.

The receiving water served as the Control treatment for this test. The effluent sample was tested at the 100% concentration only. As an additional QA measure, a Lab Water Control treatment,

consisting of reverse osmosis, de-ionized (RO/DI), was also tested. Aliquots of the receiving water, effluent sample, and Lab Control water were spiked with nutrients and then filtered (using sterile 0.45 μm filters) before use in the algal test, as per EPA guidelines. Routine water quality characteristics (pH, D.O., and conductivity) were measured on these test solutions prior to their use in the test.

There were 4 replicates for each test treatment, each consisting of a 250-mL glass Erlenmeyer flask containing 100 mL of test solution. Each flask was inoculated to an initial cell density of 10,000 cells/mL of *Selenastrum* from an ongoing PER laboratory culture that is maintained in log growth phase. These flasks were loosely capped and randomly positioned within a temperature-controlled room at 25°C, under continuous cool-white fluorescent illumination. Each day, the flasks were gently shaken in the morning and in the afternoon and re-positioned within the room.

After 96 (± 2) hours exposure, the algal cell density in each replicate flask was determined by spectrophotometric analysis. The resulting cell density data were analyzed to evaluate any impairment of algal growth caused by the effluent; all statistical analyses were performed using the CETIS® statistical software.

2.3.1 Reference Toxicant Testing of the *Selenastrum capricornutum*

In order to assess the sensitivity of the *Selenastrum* to toxic stress, a reference toxicant test was performed. The reference toxicant test was performed similarly to the effluent test except that test solutions consisting of Lab Control water spiked with NaCl at concentrations of 0.5, 1, 2, 4, and 8 gm/L were used instead of effluent dilutions. The resulting test response data were statistically analyzed to determine key dose-response point estimates (e.g., IC₅₀); all statistical analyses were made using the CETIS® software. These response endpoints were then compared to the typical response range established by the mean \pm 2 SD of the point estimates generated by the most recent previous reference toxicant tests performed by this lab.

2.4 Survival and Reproduction Toxicity Testing with *Ceriodaphnia dubia*

The short-term chronic *Ceriodaphnia* test consists of exposing individual females to effluent or receiving water for the length of time it takes for the Lab Control treatment females to produce 3 broods (typically 6-8 days), after which effects on survival and reproduction are evaluated. The specific procedures used in this test are described below.

The receiving water served as the Control treatment for this test. The effluent sample was tested at the 100% concentration only. As an additional QA measure, a Lab Water Control treatment, consisting of a mixture of commercial spring waters (80% Arrowhead:20% Evian) was also tested. Aliquots of the receiving water, the effluent sample, and the Lab Water Control water were used to prepare daily test solutions; for each treatment, 200 mL of test solution was amended with the alga *Selenastrum capricornutum* and Yeast-Cerophyll-Trout Food (YCT) to

provide food for the test organisms. "New" water quality characteristics (pH, D.O., and conductivity) were measured on these food-amended test solutions prior to use in this test. Each day of the test, fresh test solutions and a "new" set of replicate cups were prepared and characterized, as before.

There were 10 replicates for each test treatment, each replicate consisting of 15 mL of test solution in a 30-mL plastic cup. This "3-brood" test was initiated by allocating one neonate (< 24 hours old) *Ceriodaphnia*, obtained from ongoing laboratory cultures, into each replicate. The replicate cups were placed into foam boards that floated in a temperature-controlled room at 25°C, under cool-white fluorescent lighting on a 16L:8D photoperiod.

Each test replicate cup was examined daily, with surviving "original" individual organisms being transferred to the corresponding new cup containing fresh test solution. The contents of each remaining "old" replicate cup were carefully examined, and the number of neonate offspring produced by each original organism was determined, after which "old" water quality characteristics (pH, D.O., and conductivity) were measured for the "old" media from one randomly-selected replicate at each treatment.

After it was determined that $\geq 60\%$ of the *Ceriodaphnia* in the Lab Control treatment had produced their third brood of offspring, the test was terminated. The resulting survival and reproduction (number of offspring) data were analyzed to evaluate any impairment(s) caused by the effluent; all statistical analyses were performed using the CETIS® statistical software.

2.4.1 Reference Toxicant Testing of the *Ceriodaphnia dubia*

In order to assess the sensitivity of the *Ceriodaphnia* test organisms to toxic stress, a reference toxicant test was performed. The reference toxicant test was performed similarly to the effluent test except that test solutions consisting of Lab Control water spiked with NaCl at test concentrations of 250, 500, 1000, 1500 and 2000 mg/L were used instead of effluent dilutions. The resulting test response data were statistically analyzed to determine key dose-response point estimates (e.g., EC50); all statistical analyses were made using the CETIS® software. These response endpoints were then compared to the typical response range established by the mean \pm 2 SD of the point estimates generated by the most recent previous reference toxicant tests performed by this lab.

2.5 Survival and Growth Toxicity Testing with Larval Fathead Minnows

The chronic fathead minnow test consists of exposing larval fish to effluent or receiving water for 7 days, after which effects on survival and growth are evaluated. The specific procedures used in this test are described below.

The receiving water served as the Control treatment for this test. The effluent sample was tested at the 100% concentration only. As an additional QA measure, a Lab Water Control treatment,

consisting of US EPA synthetic moderately-hard water, was also tested. "New" water quality characteristics (pH, D.O., and conductivity) were measured on these test solutions prior to use in the test. Each day of the test, fresh test solutions were prepared and characterized as before.

There were 4 replicates at each test treatment, each replicate consisting of 400 mL of test media in a 600-mL glass beaker. This test was initiated by randomly allocating 10 larval fathead minnows (<48 hrs old) into each replicate. The replicate beakers were placed in a temperature-controlled room at 25°C, under cool-white fluorescent lighting on a 16L:8D photoperiod. The test fish were fed brine shrimp nauplii twice daily.

Each replicate was examined daily, with any dead animals, uneaten food, wastes, and other detritus being removed. The number of live fish in each replicate was determined and then approximately 80% of the test media in each beaker was carefully poured out and replaced with fresh test solution. "Old" water quality characteristics (pH, D.O., and conductivity) were measured on the old test water that had been discarded from one randomly-selected replicate at each treatment.

After 7 days exposure, the number of live fish in each replicate beaker was recorded. The fish from each replicate were then carefully euthanized in methanol, rinsed in de-ionized water, and transferred to a pre-dried and pre-tared weighing pan. These fish were then dried at 100°C for 24 hrs and re-weighed to determine the total weight of fish in each replicate; the total weight was then divided by the initial number of fish per replicate (n=10) to determine the "biomass value". The resulting survival and growth ("biomass value") data were analyzed to evaluate any impairment(s) caused by the effluent; all statistical analyses were performed using the CETIS® statistical software.

2.5.1 Reference Toxicant Testing of the Larval Fathead Minnows

In order to assess the sensitivity of the fish to toxic stress, a reference toxicant test was performed concurrently with the effluent test. The reference toxicant test was performed similarly to the effluent test except that test solutions consisting of Lab Control media spiked with copper (as CuSO₄) at test concentrations of 6.25, 12.5, 25, 50, and 100 µg/L were used instead of effluent dilutions. The resulting test response data were analyzed to determine key dose-response point estimates (e.g., EC₅₀); all statistical analyses were made using the CETIS® software. These response endpoints were then compared to the typical response range established by the mean ± 2 SD of the point estimates generated by the 20 most recent previous reference toxicant tests performed by this lab.

4. RESULTS

3.1 Acute Effects of the Effluent on Fathead Minnows

The results of this test are summarized in Table 2. There was 100% survival in the Receiving Water Control treatment; there was also 100% survival in the effluent treatment, which was not significantly less than the Receiving Water Control, indicating that there was no acute toxicity to fathead minnows present in the effluent sample.

There was 100% survival in the Lab Water Control treatment.

The test data and summary of statistics for this test are presented in Appendix B.

Table 2. Acute effects of the effluent on fathead minnows.	
Test Treatment	Mean % Survival
Lab Water Control	100
Receiving Water Control	100
100% Effluent	100

3.2 Chronic Effects of the Effluent on *Selenastrum capricornutum*

The results of this test are summarized below in Table 3. There was a mean final algal cell density of 4,499,000 cells/mL at the Receiving Water Control treatment; there were no significant reductions in algal cell density in the effluent. The NOEC was 100% effluent, resulting in 1.0 TUc (where TUc = 100/NOEC).

There was a mean final algal cell density of 3,070,000 cells/mL in the Lab Control.

The test data and summary of statistical analyses for this test are presented in Appendix C.

Table 3. Effects of the effluent on <i>Selenastrum capricornutum</i> growth.	
Effluent Treatment	Mean Cell Density (cells/mL x 10 ⁶)
Lab Water Control	3.07
Receiving Water Control	4.99
100% Effluent	4.57

3.2.1 Reference Toxicant Toxicity to *Selenastrum capricornutum*

The results of this test are summarized below in Table 4. There was a mean of 2,620,000 cells/mL in the Lab Control treatment. The IC₅₀ was 1.94 gm/L NaCl.

These reference toxicant test results are consistent with previous *Selenastrum* reference toxicant tests performed in this laboratory, indicating that these organisms were responding to toxic stress in a typical fashion.

The test data and summary of statistical analyses for this test are presented in Appendix D.

Table 4. Reference toxicant testing: effects of NaCl on <i>Selenastrum capricornutum</i> growth.	
NaCl Treatment (gm/L)	Mean Algal Density (cells/mL x 10 ⁶)
Lab Control	2.62
0.5	2.65
1	2.17*
2	1.26*
4	0.349*
8	0.034*
Summary of Statistics	
IC ₅₀ = 1.94 gm/L NaCl	

* Significantly less than the Lab Control treatment response at p < 0.05.

3.3 Chronic Effects of the Effluent on *Ceriodaphnia dubia*

The results for this test are summarized below in Table 5. There was 100% survival and a mean of 19.5 offspring per female at the Receiving Water Control treatment; there were no significant reductions in survival or reproduction in the effluent. The NOECs of 100% effluent resulted in 1.0 TUC (where $TUC = 100/NOEC$) for both test endpoints.

Due to problems encountered with the Lab Water Control test solution on Day 6 of the test, test organism survival in the Lab Control treatment was unacceptably low; however, the Receiving Water Control met all the test acceptability criteria and the effluent test results are considered valid.

The test data and summary of statistical analyses for this test are presented in Appendix E.

Table 5. Effects of the effluent on <i>Ceriodaphnia dubia</i> survival and reproduction.		
Effluent Treatment	% Survival	Reproduction (# neonates/female)
Lab Water Control	0	5.5
Receiving Water Control	100	19.5
100% Effluent	100	19.4

3.3.1 Reference Toxicant Toxicity to *Ceriodaphnia dubia*

Due to problems encountered with the Lab Water Control test solution on Day 6 of the test, test organism survival in the control treatment was unacceptable low. As a result, and in order to provide confirmatory weight-of-evidence as to the quality of the test organisms, the results of the reference toxicant tests that were performed immediately prior to and immediately following the current effluent test are presented below.

Results of the reference toxicant test initiated on February 12, 2008, are summarized below in Table 6a. There was 100% survival and a mean of 25.6 neonates per female at the Lab Control treatment. The survival EC₅₀ was 1842 mg/L NaCl, and the reproduction IC₂₅ was 981 mg/L NaCl.

The reference toxicant test results were consistent with the reference toxicant test database, indicating that these test organisms were responding to toxic stress in a typical fashion.

The test data and the summary of statistical analyses for this test are presented in Appendix F.

Table 6a. Reference toxicant testing (2/12/08): Effects of NaCl on <i>Ceriodaphnia dubia</i>		
Treatment (mg/L NaCl)	% Survival	Reproduction (# neonates/female)
Lab Control	100	25.6
250	100	25.5
500	100	24.4
1000*	100	19*
1500*	100	8.9*
2000*	30*	0
Summary of Key Statistics		
Survival EC50 or Reproduction IC25 =	1842 mg/L NaCl	981 mg/L NaCl

* Significantly less than the Lab Control treatment response at $p < 0.05$.

Results of the reference toxicant test initiated on March 11, 2008, are summarized below in Table 6b. There was 80% survival and a mean of 20 neonates per female at the Lab Control treatment. The survival EC50 was 1732 mg/L NaCl, and the reproduction IC25 was 1121 mg/L NaCl.

The reference toxicant test results were consistent with the reference toxicant test database, indicating that these test organisms were responding to toxic stress in a typical fashion.

The test data and the summary of statistical analyses for this test are also presented in Appendix F.

Table 6b. Reference toxicant testing (2/12/08): Effects of NaCl on <i>Ceriodaphnia dubia</i>		
Treatment (mg/L NaCl)	% Survival	Reproduction (# neonates/female)
Lab Control	80	20.0
250	100	19.6
500	100	20.8
1000*	100	16.7*
1500*	100	10.1*
2000*	0*	0
Summary of Key Statistics		
Survival EC50 or Reproduction IC25 =	1732 mg/L NaCl	1121 mg/L NaCl

* Significantly less than the Lab Control treatment response at $p < 0.05$.

3.4 Chronic Effects of the Effluent on Fathead Minnows

The results of this test are summarized below in Table 7. There was 94% survival at the Receiving Water Control treatment; there was 62.5% survival in the 100% effluent treatment, which was significantly less than the Receiving Water Control. The NOEC was 100% effluent, resulting in 1.0 TUC (where $TUC = 100/NOEC$).

The mean fish biomass value was 0.47 mg at the Receiving Water Control treatment; there were no significant reductions in growth in the effluent.

There was 100% survival and a mean fish biomass value of 0.52 mg at the Lab Control treatment.

It should be noted that the fish in the effluent treatment replicates exhibited pathogen-related mortality (PRM), which is characterized by dead fish encased in a 'corona' of fungal filaments and inter-replicate variability. It is recommended that future testing be performed using an alternative approved EPA method that reduces the impact of PRM on fathead minnow toxicity tests.

The test data and the summary of statistical analyses for this test are presented in Appendix G.

Table 7. Effects of the effluent on fathead minnow survival and growth.		
Effluent Treatment	Mean % Survival	Mean Fish Biomass Value (mg)
Lab Water Control	100	0.52
Receiving Water Control	92.5	0.47
100% Effluent	62.5*	0.08

* Significantly less than the Receiving Water Control treatment response at $p < 0.05$.

3.4.1 Reference Toxicant Toxicity to Fathead Minnows

The results of this test are summarized below in Table 8. There was 100% survival and a mean biomass value of 0.54 mg at the Lab Control treatment. The survival EC₅₀ value was 18.4 µg/L Cu, and the growth IC₅₀ was 17.2 µg/L Cu.

These reference toxicant test results are consistent with previous fathead minnow reference toxicant tests performed in this laboratory, indicating that these organisms were responding to toxic stress in a typical fashion.

The test data and summary of statistical analyses for this test are presented in Appendix H.

Table 8. Reference toxicant testing: effects of copper on fathead minnows.		
Copper Treatment (µg/L)	Mean % Survival	Overall Mean Biomass Value
Lab Control	100	0.54
6.25	97.5	0.57
12.5	97.5	0.50
25	7.7*	0.02
50	0*	0.00
100	0*	0.00
Summary of Statistics		
Survival EC ₅₀ or Growth IC ₅₀ =	18.4 µg/L Cu	17.2 µg/L Cu

* Significantly less than the Lab Control treatment response at $p < 0.05$.

4. SUMMARY AND CONCLUSIONS

Acute Effects of "EFF-001 Discharge" Effluent on Fathead Minnows

There were no significant reductions in survival, indicating that the "EFF-001 Discharge" effluent was not acutely toxic to fathead minnows.

Chronic Effects of "EFF-001 Discharge" Effluent on *Selenastrum capricornutum*

There were no significant reductions in algal growth in the effluent sample; the NOEC was <100% effluent, resulting in >1.0 TUC.

Chronic Effects of "EFF-001 Discharge" Effluent on *Ceriodaphnia dubia*

There were no significant reductions in survival or reproduction in the effluent sample. The NOECs of 100% effluent resulted in 1.0 TUC (where $TUC = 100/NOEC$) for both test endpoints.

Chronic Effects of "EFF-001 Discharge" Effluent on Fathead Minnows

There was a significant reduction in fathead minnow survival in the effluent; the NOEC was <100% effluent, resulting in >1.0 TUC. The significant reductions in fathead minnow survival were likely due to PRM. It is recommended that future testing be performed using an alternative approved EPA method that reduces the impact of PRM on fathead minnow toxicity tests.

4.1 QA/QC Summary

Test Conditions – Test conditions (pH, D.O., temperature, etc.) were all within acceptable limits for these effluent tests. All analyses were performed according to the laboratory Standard Operating Procedures.

Negative Lab Control – Due to problems encountered with the Lab Water Control test solution on Day 6 of the test, test organism survival in the control treatment was unacceptably low; however, since the Receiving Water Control met test acceptability criteria and is the basis for evaluating the presence or absence of toxicity, the poor survival in the Lab Water Control does not affect the interpretation of the effluent test. The biological responses for the *Selenastrum capricornutum* and fathead minnows at the Lab Control treatments were within acceptable limits.

Positive Control – As a result, and in order to provide confirmatory weight-of-evidence as to the quality of the test organisms, the results of the reference toxicant tests that were performed immediately prior to and immediately following the current effluent test were presented.

The results for the reference toxicant tests were consistent with the reference toxicant test database, indicating that these test organisms were responding to toxic stress in a typical fashion.

Concentration Response Relationships – There were valid concentration-response relationships for the reference toxicant, which were therefore deemed acceptable for this testing.

Appendix A

Chain-of-Custody Records for the Collection and Delivery of the Effluent and Receiving Water Samples

Chain of Custody Form

[illegible]

Appendix B

Test Data and Summary of Statistics for the Evaluation of the Acute Toxicity of the Effluent to Fathead Minnows

CETIS Test Summary

Report Date:

03 Apr-08 10:46 AM

Test Link:

07-8250-3673/27770

Acute Fish Survival Test				Pacific EcoRisk				
Test No:	15-4113-8302	Test Type:	Survival (96h)	Duration:	94h			
Start Date:	05 Mar-08 05:00 PM	Protocol:	EPA/600/4-90/027F (1991)	Species:	Pimephales promelas			
Ending Date:	09 Mar-08 03:15 PM	Dil Water:	Not Applicable	Source:	Aquatic Biosystems, CO			
Setup Date:	05 Mar-08 05:00 PM	Brine:	Not Applicable					
Sample No:	02-8216-0966	Code:	13054	Client:	Precision Analytical			
Sample Date:	04 Mar-08 11:20 AM	Material:	Effluent	Project:	NPDES			
Receive Date:	05 Mar-08 11:00 AM	Source:	Precision Analytical					
Sample Age:	30h (19.7 °C)	Station:	EFF-001					
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method		
10-1153-6079	96h Proportion Survived	100	> 100	N/A	N/A	Fisher Exact		
96h Proportion Survived Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Water	2	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
100		2	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
96h Proportion Survived Detail								
Conc-%	Control Type	Rep 1	Rep 2					
0	Lab Water	1.00000	1.00000					
100		1.00000	1.00000					

CETIS Analysis Detail

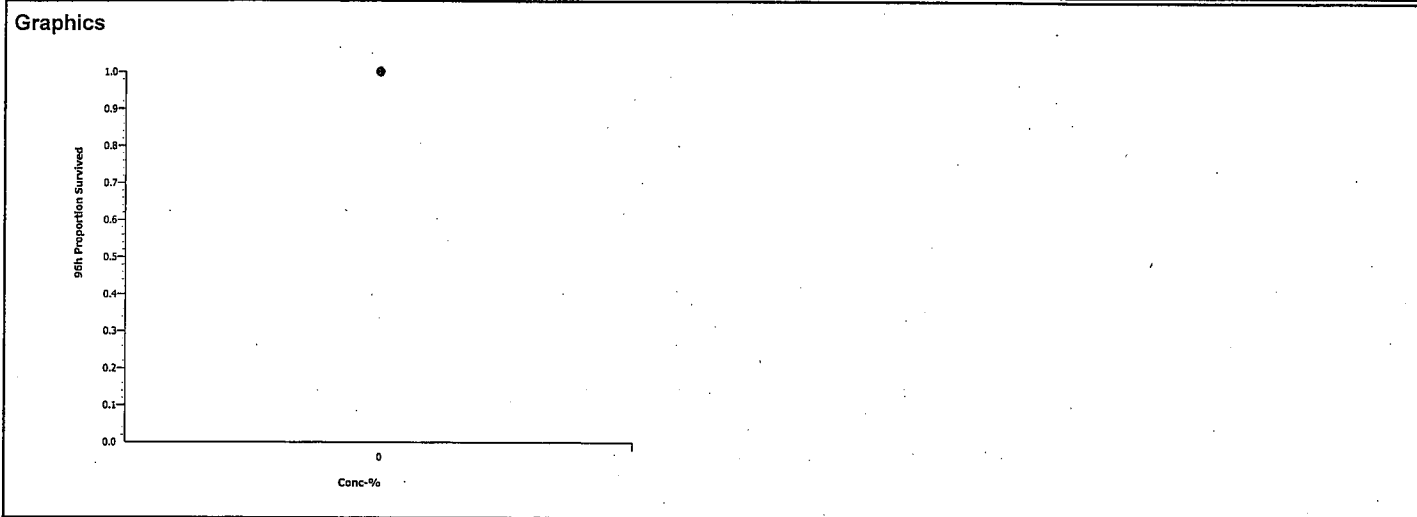
Acute Fish Survival Test	Pacific EcoRisk
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
96h Proportion Survived	Comparison	07-8250-3673	07-8250-3673	03 Apr-08 10:46 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Fisher Exact	C > T	Untransformed		100	>100	1	N/A	

Group Comparisons					
Control	vs	Conc-%	Statistic	P-Value	Decision(0.05)
Lab Water		100	1.00000	1.00000	Non-Significant Effect

Data Summary				
Conc-%	Control Type	Non-Responders	Responders	Total Observed
0	Lab Water	20	0	20
100		20	0	20



96 Hour Acute Fathead Minnow Toxicity Test

Client: **Precision Analytical**
 Test Material: **EFF-001**
 Test ID#: **27770** Project #: **13054**
 Test Date: **3/5/08**
 Feeding T₀ Time: **1000** Initials: **CB**

Organism Log #: **3789** Age: **3d**
 Organism Supplier: **ABS**
 Control: **EPAMH**
 Control Water Batch: **1083**
 Feeding T46-hr Time: **830** Initials: **CB**

Treatment	Temp (°C)	pH		D.O. (mg/L)		Conductivity (µS/cm)		# Live Organisms		SIGN-OFF
		new	old	new	old	new	old	Rep A	Rep B	
Control	20.4	8.26		10.0		294		10	10	Date: 3/5/08 Sample ID: 19157 Test Solution Prep: 20
100%	20.4	7.88		9.4		852		10	10	New WQ: 285 Initiation Time: 1700 Initiation Signoff: 20
Meter ID	6A	PH23		DO12		EC04				
Control	20.1		8.39		8.7		301	10	10	Date: 3-6-08 Count Time: 1135 Count Signoff: K
100%	20.1		8.26		9.2		862	10	10	Old WQ: HTA
Meter ID	6A		PH23		DO14		EC01			
Control	20.2	8.23	8.54	9.5	7.4	294	330	10	10	Date: 3/7/08 Sample ID: 19157 Test Solution Prep: W
100%	20.2	8.08	8.64	9.9	7.1	853	874	10	10	New WQ: MB Renewal Time: 14:15 Renewal Signoff: CB
Meter ID	6A	PH12	PH12	DO10	DO10	EC04	EC04			Old WQ: MB
Control	20.1		7.90		8.3		304	10	10	Date: 3/8/08 Count Time: 1015 Count Signoff: JJ
100%	20.1		8.16		8.0		863	10	10	Old WQ: HM
Meter ID	6A		PH11		DO10		EC01			
Control	20.1		7.87		8.5		327	10	10	Date: 3/9/08 Termination Time: 1515 Termination Signoff: MZ
100%	20.1		8.25		8.5		901	10	10	Old WQ: HM
Meter ID	6A		PH11		DO10		EC01			

CETIS Test Summary

Report Date: 03 Apr-08 10:47 AM
 Test Link: 02-8885-4315/27771

Acute Fish Survival Test						Pacific EcoRisk		
Test No:	15-4113-8302	Test Type:	Survival (96h)	Duration:	94h			
Start Date:	05 Mar-08 05:00 PM	Protocol:	EPA/600/4-90/027F (1991)	Species:	Pimephales promelas			
Ending Date:	09 Mar-08 03:15 PM	Dil Water:	Not Applicable	Source:	Aquatic Biosystems, CO			
Setup Date:	05 Mar-08 05:00 PM	Brine:	Not Applicable					
Sample No:	00-8480-3111	Code:	13054	Client:	Precision Analytical			
Sample Date:	04 Mar-08 11:45 AM	Material:	Effluent	Project:	NPDES			
Receive Date:	05 Mar-08 11:00 AM	Source:	Precision Analytical					
Sample Age:	29h (19.9 °C)	Station:	RSW-001					
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method		
07-7479-0749	96h Proportion Survived	100	>100	N/A	N/A	Fisher Exact		
96h Proportion Survived Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Water	2	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
100		2	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
96h Proportion Survived Detail								
Conc-%	Control Type	Rep 1	Rep 2					
0	Lab Water	1.00000	1.00000					
100		1.00000	1.00000					

CETIS Analysis Detail

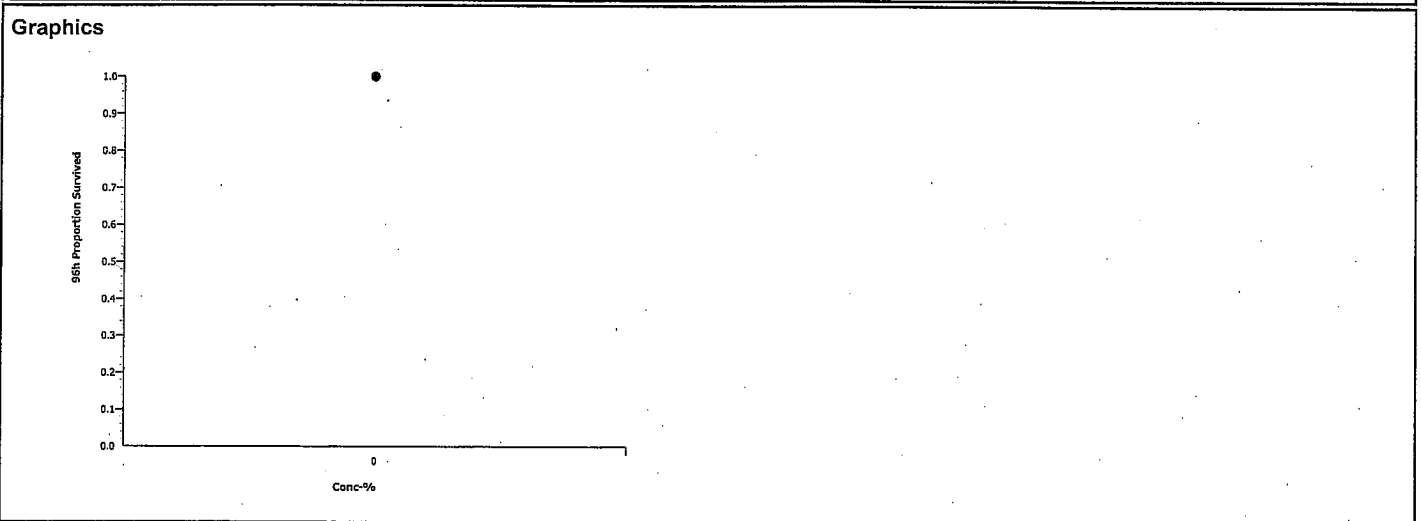
Acute Fish Survival Test						Pacific EcoRisk
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
96h Proportion Survived	Comparison	02-8885-4315	02-8885-4315	03 Apr-08 10:47 AM	CETISv1.1.2

Method	Alt .H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Fisher Exact	C > T	Untransformed		100	>100	1	N/A	

Group Comparisons					
Control	vs	Conc-%	Statistic	P-Value	Decision(0.05)
Lab Water		100	1.00000	1.00000	Non-Significant Effect

Data Summary				
Conc-%	Control Type	Non-Responders	Responders	Total Observed
0	Lab Water	20	0	20
100		20	0	20



96 Hour Acute Fathead Minnow Toxicity Test

Client: Precision Analytical
 Test Material: RSW-001
 Test ID#: 27771 Project #: 13054
 Test Date: 3/5/08
 Feeding T₅ Time: 1000 Initials: CB

Organism Log #: 3789 Age: 9d
 Organism Supplier: ABS
 Control: EPANET
 Control Water Batch: 1083
 Feeding T46-hr Time: 8:50 Initials: CB

Treatment	Temp (°C)	pH		D.O. (mg/L)		Conductivity (µS/cm)		# Live Organisms		SIGN-OFF
		new	old	new	old	new	old	Rep A	Rep B	
Control	20.4	8.26		10.0		294		10	10	Date: <u>3/5/08</u> Sample ID: <u>19158</u> Test Solution Prep: <u>AD</u>
100%	20.4	8.02		9.5		275		10	10	New WQ: <u>CB</u> Initiation Time: <u>1700</u> Initiation Signoff: <u>AD</u>
Meter ID	6A	PH03		DO12		EC04				
Control	20.1		8.39		8.7		301	10	10	Date: <u>3-6-08</u> Count Time: <u>1135</u> Count Signoff: <u>CB</u>
100%	20.1		8.41		9.2		274	10	10	Old WQ: <u>ADA</u>
Meter ID	6A		PH03		DO14		EC01			
Control	20.2	8.23	8.54	9.5	7.4	294	330	10	10	Date: <u>3/7/08</u> Sample ID: <u>179158</u> Test Solution Prep: <u>CB</u>
100%	20.2	8.14	8.52	9.8	7.2	266	280	10	10	New WQ: <u>MB</u> Renewal Time: <u>14:15</u> Renewal Signoff: <u>CB</u>
Meter ID	6A	PH12	PH12	DO10	DO10	EC04	EC04			Old WQ: <u>MB</u>
Control	20.1		7.90		8.3		304	10	10	Date: <u>3/8/08</u> Count Time: <u>1015</u> Count Signoff: <u>JS</u>
100%	20.1		8.05		8.2		279	10	10	Old WQ: <u>HN</u>
Meter ID	6A		PH11		DO11		EC01			
Control	20.1		7.87		8.5		327	10	10	Date: <u>3/9/08</u> Termination Time: <u>1515</u> Termination Signoff: <u>MB</u>
100%	20.1		8.20		8.4		305	10	10	Old WQ: <u>HN</u>
Meter ID	6A		PH11		DO10		EC05			

Appendix C

Test Data and Summary of Statistics for the Evaluation of the Chronic Toxicity of the Effluent to *Selenastrum capricornutum*

CETIS Test Summary

Report Date:

03 Apr-08 10:55 AM

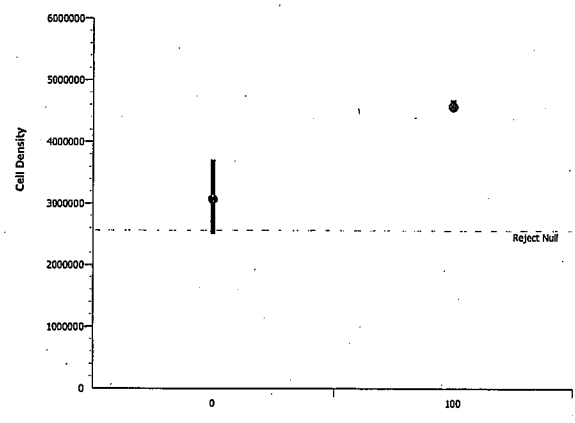
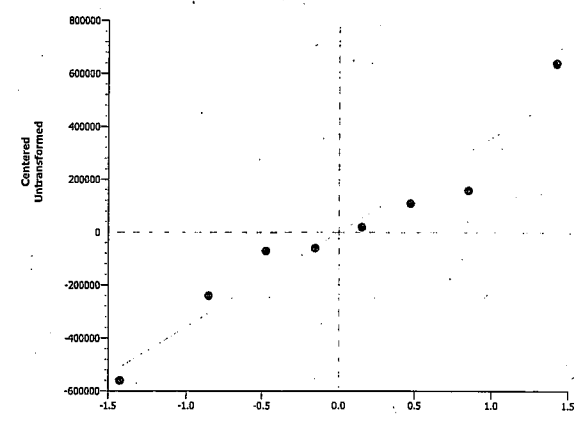
Test Link:

00-9902-9290/27817

Selenastrum Growth Test						Pacific EcoRisk			
Test No:	11-2795-3534	Test Type:	Cell Growth	Duration:	95h				
Start Date:	05 Mar-08 03:05 PM	Protocol:	EPA/600/4-91/002 (1994)	Species:	Selenastrum capricornutum				
Ending Date:	09 Mar-08 02:00 PM	Dil Water:	Receiving Water	Source:	In-House Culture				
Setup Date:	05 Mar-08 03:05 PM	Brine:	Not Applicable						
Sample No:	02-8216-0966	Code:	13054	Client:	Precision Analytical				
Sample Date:	04 Mar-08 11:20 AM	Material:	Effluent	Project:	NPDES				
Receive Date:	05 Mar-08 11:00 AM	Source:	Precision Analytical						
Sample Age:	28h (19.7 °C)	Station:	EFF-001						
Comparison Summary									
Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method			
15-6467-1194	Cell Density	100	> 100	N/A	16.62%	Equal Variance t Two-Sample			
19-5276-9472		0	> 0	N/A	20.66%	Equal Variance t Two-Sample			
Cell Density Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Lab Water	4	3.07E+6	2.51E+6	3.71E+6	2.59E+5	5.18E+5	16.89%	
0	Receiving Wat	4	4.99E+6	4.66E+6	5.49E+6	1.98E+5	3.97E+5	7.95%	
100		4	4.57E+6	4.50E+6	4.68E+6	4.18E+4	8.37E+4	1.83%	
Cell Density Detail									
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4				
0	Lab Water	3.71E+6	3.23E+6	2.83E+6	2.51E+6				
0	Receiving Wat	5.12E+6	4.68E+6	5.49E+6	4.66E+6				
100		4.68E+6	4.59E+6	4.51E+6	4.50E+6				



CETIS Analysis Detail

Selenastrum Growth Test							Pacific EcoRisk			
Endpoint		Analysis Type		Sample Link	Control Link	Date Analyzed	Version			
Cell Density		Comparison		00-9902-9290	00-9902-9290	03 Apr-08 10:55 AM	CETISv1.1.2			
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD		
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	16.62%		
Group Comparisons										
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)			
Lab Water		100	-5.7125	1.94318	0.9994	510247	Non-Significant Effect			
ANOVA Table										
Source	Sum of Squares		Mean Square	DF	F Statistic	P-Value	Decision(0.05)			
Between	4.5E+12		4.5E+12	1	32.63	0.00125	Significant Effect			
Error	8.274E+11		1.379E+11	6						
Total	5.3274E+12		4.638E+12	7						
ANOVA Assumptions										
Attribute	Test		Statistic	Critical	P-Value	Decision(0.01)				
Variances	Variance Ratio F		38.40000	47.46723	0.01362	Equal Variances				
Distribution	Shapiro-Wilk W		0.95440		0.75536	Normal Distribution				
Data Summary										
			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Water	4	3.07E+6	2.51E+6	3.71E+6	5.18E+5				
100		4	4.57E+6	4.50E+6	4.68E+6	8.37E+4				
Graphics										
										

CETIS Analysis Detail

Comparisons: Page 2 of 2
 Report Date: 03 Apr-08 10:55 AM
 Analysis: 19-5276-9472/27817

Selenastrum Growth Test Pacific EcoRisk

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Comparison	00-9902-9290	00-9902-9290	03 Apr-08 10:55 AM	CETISv1.1.2

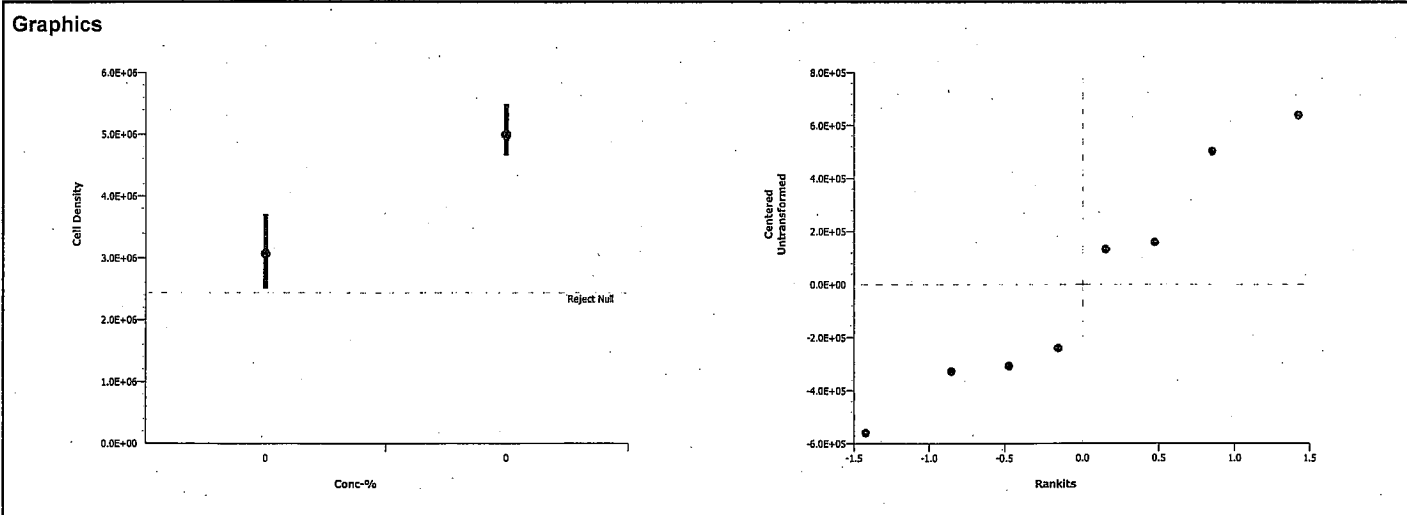
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		0	>0	N/A	N/A	20.66%

Control	vs	Control	Statistic	Critical	P-Value	MSD	Decision(0.05)
Lab Water		Receiving Water/Effl	-5.8751	1.94318	0.9995	634212	Non-Significant Effect

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	7.354E+12	7.354E+12	1	34.52	0.00108	Significant Effect
Error	1.278E+12	2.130E+11	6			
Total	8.6319E+12	7.567E+12	7			

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.70893	47.46723	0.67064	Equal Variances
Distribution	Shapiro-Wilk W	0.93203		0.53474	Normal Distribution

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Water	4	3.07E+6	2.51E+6	3.71E+6	5.18E+5				
0	Receiving Wat	4	4.99E+6	4.66E+6	5.49E+6	3.97E+5				



***Selenastrum capricornutum* Algal Toxicity Test Data Sheet**

Client: Precision Analytical Sample ID: Effluent
 Test Start Date: 3/5/08 Test ID #: 27817 Project #: 13054
 Test End Date: 3/9/08 Control/Diluent: Algal medium w/o EDTA Location: RSS1

All Control Water is unfiltered

Test Treatment	Temp (°C)	pH	D.O. (mg/L)	Conductivity (µS/cm)	Sign-Off
Lab Water Control	25.0	7.59	9.2	99	Date: 3/5/08
Receiving Water	25.0	8.11	9.4	349	Sample ID #: 19157
100%	25.0	7.99	9.2	914	Test Solution Prep: MR
					New WQ: MB for CCS
					Inoculation Time: 1505
Meter ID	6	PH03	D012	ECO4	Inoculation Signoff: MR
Lab Water Control	25.6	7.86			Date: 3-6-08
Receiving Water	25.6	8.34			WQ Time: 0950
100%	25.6	8.39			WQ Signoff: MB
Meter ID	9A	PH11			
Lab Water Control	25.3	9.43			Date: 3-7-08
Receiving Water	25.3	8.74			WQ Time: 1325
100%	25.3	8.90			WQ Signoff: MB for CCS
Meter ID	6	PH11			
Lab Water Control	25.1	10.05			Date: 3/8/08
Receiving Water	25.1	9.71			WQ Time: 1340
100%	25.1	9.41			WQ Signoff: AS
Meter ID	6	PH11			
Lab Water Control	25.3	10.20	16.2	148	Date: 3-9-08
Receiving Water	25.3	10.37	720.0	349	WQ Time: 955
100%	25.3	9.86	720.0	842	WQ Signoff: ASF MR
Meter ID	6	PH12	D014	ECO4	WQ Signoff: MR

Initial Count: 10,000 cells/mL Termination Time: 1400 Enumerating Scientist: MR

Treatment	Cell Density (cells/mL x 10 ⁶)				Mean Cell Density (cells/mL x 10 ⁶)	
	Rep A	Rep B	Rep C	Rep D		
Lab Water Control	3.71	3.23	2.83	2.51	3.07	
Receiving Water	5.12	4.68	5.49	4.66	4.99	
100%	4.68	4.59	4.51	4.50	4.57	
This datasheet has been reviewed for completeness and consistency with Test Acceptability Criteria and/or other issues of concern.			Control Mean Density (cells/mL x 10 ⁶)	% CV	Date:	Time: Signoff:
		Lab Water Control	3.07	16.9	3/9/08	1415 MR
		Receiving Water	4.99	7.9	3/9/08	1415 MR
		100%	4.57	-	-	-

Initial Test Conditions	Alkalinity	Hardness	Light Intensity (ftc)
	✓ 231	✓ 101	412

Appendix D

Test Data and Summary of Statistics for the Reference Toxicant Evaluation of the *Selenastrum capricornutum*

CETIS Test Summary

Report Date:

10 Mar-08 1:19 PM

Test Link:

14-2422-6748/27814

Selenastrum Growth Test						Pacific EcoRisk		
Test No:	04-7884-2458	Test Type:	Cell Growth	Duration:	4d 0h			
Start Date:	05 Mar-08 01:30 PM	Protocol:	EPA/821/R-02-013 (2002)	Species:	Selenastrum capricornutum			
Ending Date:	09 Mar-08 02:00 PM	Dil Water:	Laboratory Water	Source:	In-House Culture			
Setup Date:	05 Mar-08 01:30 PM	Brine:	Not Applicable					
Sample No:	03-6829-9659	Code:	13057	Client:				
Sample Date:	05 Mar-08 01:30 PM	Material:	Sodium chloride	Project:				
Receive Date:	05 Mar-08 01:30 PM	Source:	Reference Toxicant					
Sample Age:	N/A (25 °C)	Station:	In House					
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method		
14-2808-7569	Cell Density	0.5	1	0.70711	11.20%	Steel Many-One Rank		
Point Estimate Summary								
Analysis	Endpoint	% Effect	Conc-g/L	95% LCL	95% UCL	Method		
06-8484-2301	Cell Density	1	0.5280933	N/A	0.5483798	Linear Interpolation		
		5	0.6404667	0.07697	0.7418988			
		10	0.7809333	0.4148443	0.9837978			
		15	0.9214	0.6336427	1.164672			
		20	1.064266	0.8177669	1.300168			
		25	1.21018	0.9674854	1.44352			
		40	1.647922	1.396043	1.919051			
		50	1.939751	1.66115	2.383147			
Cell Density Summary								
Conc-g/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Water	4	2.62E+6	2.25E+6	2.84E+6	1.33E+5	2.65E+5	10.12%
0.5		4	2.65E+6	2.40E+6	3.01E+6	1.31E+5	2.62E+5	9.91%
1		4	2.17E+6	2.11E+6	2.21E+6	2.22E+4	4.43E+4	2.05%
2		4	1.26E+6	1.06E+6	1.51E+6	9.59E+4	1.92E+5	15.20%
4		4	3.49E+5	3.20E+5	3.70E+5	1.10E+4	2.21E+4	6.33%
8		4	3.35E+4	3.07E+4	3.55E+4	1.03E+3	2.06E+3	6.14%
Cell Density Detail								
Conc-g/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4			
0	Lab Water	2.78E+6	2.25E+6	2.84E+6	2.61E+6			
0.5		2.65E+6	2.40E+6	2.53E+6	3.01E+6			
1		2.15E+6	2.21E+6	2.19E+6	2.11E+6			
2		1.18E+6	1.51E+6	1.06E+6	1.30E+6			
4		3.43E+5	3.61E+5	3.20E+5	3.70E+5			
8		3.44E+4	3.07E+4	3.55E+4	3.33E+4			

***Selenastrum capricornutum* Cell Density Enumeration Data**

Client: Reference Toxicant Initial Count: 10,000 cells/mL
 Test Material: NaCl Enumerating Scientist: MR
 Test Start Date: 3/5/08 Start Time: 1330 Test ID #: 27814
 Test End Date: 3/9/08 End Time: 1400 Project #: 13057

Treatment	Rep A	Rep B	Rep C	Rep D	Mean
Lab Water Control (W/EDTA)	2.78	2.25	2.84	2.61	2.63
0.5	2.65	2.40	2.53	3.01	2.65
1	2.15	2.21	2.19	2.11	2.17
2	1.18	1.51	1.06	1.30	1.01 ^{1.26}
4	0.343	0.361	0.320	0.370	0.349
8	0.0344	0.0307	0.0355	0.0333	0.0335
This datasheet has been reviewed for completeness and consistency with Test Acceptability Criteria and/or other issues of concern.	Control Mean Density (cells/mL x 10 ⁶)	% CV	Date:	Time:	Signoff:
	2.63	10.3	MR 3/9/08	1415	MR

Selenastrum capricornutum Algal Toxicity Test Water Quality DataClient: Reference ToxicantTest ID #: 27814Test Date: 3/5/08Test Material: NaClProject #: 13057Control/Diluent: Algal Medium-w/ EDTA

Reference Toxicant Test Treatment (g/L NaCl)	Temp (°C)	pH	D.O. (mg/L)	Conductivity (µS/cm)	Sign-Off
Lab Water Control	25.0	8.18	9.2	95	Date: 3/5/08
0.5	25.0	8.08	9.2	1067	Test Solution Prep: MR
1	25.0	8.05	9.2	2030	New WQ: CCS
2	25.0	8.01	9.2	3890	Innoculation Time: 1330
4	25.0	7.94	9.3	7540	Innoculation Signoff: MR
8	25.0	7.87	9.3	14440	
Meter ID:	6	PH03	DD10	EC03	
Lab Water Control	25.6	7.71			Date: 3/6/08
0.5	25.6	7.69			WQ Time: 0920
1	25.6	7.63			WQ Signoff: HTA
2	25.6	7.62			
4	25.6	7.60			
8	25.6	7.52			
Meter ID:	9A	PH12			
Lab Water Control	24.9	9.25			Date: 3/7/08
0.5	24.9	9.23			WQ Time: 1330
1	24.9	9.14			WQ Signoff: CCS
2	24.9	8.92			
4	24.9	8.68			
8	24.9	8.52			
Meter ID:	11	PH11			
Lab Water Control	24.8	9.96			Date: 3/8/08
0.5	24.8	9.81			WQ Time: 1535
1	24.8	9.65			WQ Signoff: AS
2	24.8	9.26			
4	24.8	8.94			
8	24.8	8.63			
Meter ID:	11	PH11			
Lab Water Control	24.8	10.22	14.7	128	Date: 3/9/08
0.5	24.8	10.02	14.1	1048	Termination Time: 1400
1	24.8	9.93	13.5	1942	Termination Signoff: MR
2	24.8	9.07	10.4	3770	WQ Time: 940
4	24.8	9.10	10.9	7310	WQ Signoff: HN
8	24.8	8.29	9.2	13890	
Meter ID:	11	PH12	DD14	EC05	

Initial Test Conditions	Alkalinity	Hardness	Light Intensity (ftc)
✓	9	✓ 16	415

Appendix E

Test Data and Summary of Statistics for the Evaluation of the Chronic Toxicity of the Effluent to *Ceriodaphnia dubia*

CETIS Test Summary


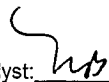
Report Date:

03 Apr-08 1:31 PM

Test Link:

17-4826-1760/27821

Cladoceran Survival and Reproduction Test						Pacific EcoRisk					
Test No:	13-3073-6950	Test Type:	Reproduction-Survival (7d)	Duration:	6d 18h						
Start Date:	05 Mar-08 06:40 PM	Protocol:	EPA/600/4-91/002 (1994)	Species:	Ceriodaphnia dubia						
Ending Date:	12 Mar-08 01:00 PM	Dil Water:	Not Applicable	Source:	In-House Culture						
Setup Date:	05 Mar-08 06:40 PM	Brine:	Not Applicable								
Sample No:	02-8216-0966	Code:	13054	Client:	Precision Analytical						
Sample Date:	04 Mar-08 11:20 AM	Material:	Effluent	Project:	NPDES						
Receive Date:	05 Mar-08 11:00 AM	Source:	Precision Analytical								
Sample Age:	31h (19.7 °C)	Station:	EFF-001								
Comparison Summary											
Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method					
05-5331-4533	7d Proportion Survived	0	>0	N/A	N/A	Fisher Exact					
12-9326-0252		100	>100	N/A	N/A	Fisher Exact					
12-6349-7291	Reproduction	100	>100	N/A	33.71%	Equal Variance t Two-Sample					
14-7054-0837		0	>0	N/A	40.02%	Equal Variance t Two-Sample					
7d Proportion Survived Summary											
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV			
0	Lab Water	10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%			
0	Receiving Wat	10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%			
100		10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%			
Reproduction Summary											
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV			
0	Lab Water	10	5.5	4	11	0.67082	2.12132	38.57%			
0	Receiving Wat	10	19.5	13	24	1.07755	3.40751	17.47%			
100		10	19.4	15	23	0.83267	2.63312	13.57%			
7d Proportion Survived Detail											
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0	Receiving Wat	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
100		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
Reproduction Detail											
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	5	6	6	11	4	5	6	4	4	4
0	Receiving Wat	13	19	23	19	15	19	22	20	24	21
100		20	18	17	22	15	19	23	21	22	17



CETIS Analysis Detail

Comparisons: Page 1 of 2
 Report Date: 03 Apr-08 1:31 PM
 Analysis: 12-6349-7291/27821

Cladoceran Survival and Reproduction Test Pacific EcoRisk

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Reproduction	Comparison	17-4826-1760	17-4826-1760	03 Apr-08 1:30 PM	CETISv1.1.2

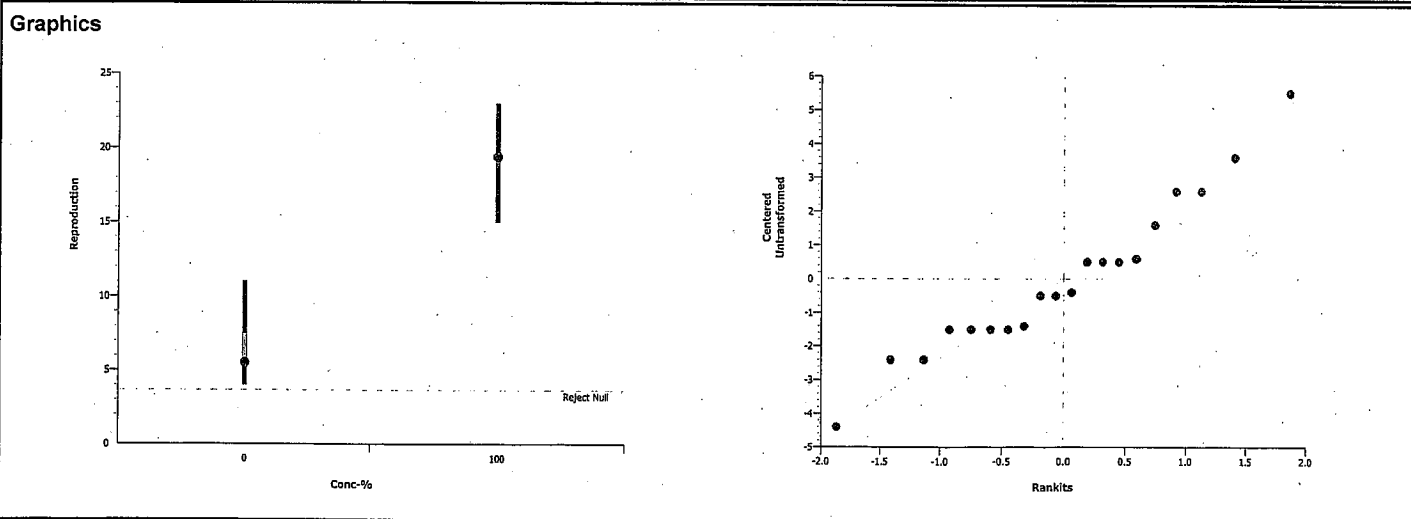
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	33.71%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Lab Water		100	-13	1.73406	1.0000	1.85418	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	966.05	966.05	1	168.99	0.00000	Significant Effect
Error	102.9	5.716667	18			
Total	1068.94999	971.76665	19			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.54074	6.54109	0.52980	Equal Variances
Distribution	Shapiro-Wilk W	0.95914		0.52691	Normal Distribution

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Water	10	5.5	4	11	2.12132				
100		10	19.4	15	23	2.63312				



CETIS Analysis Detail

Cladoceran Survival and Reproduction Test							Pacific EcoRisk			
Endpoint		Analysis Type		Sample Link		Control Link	Date Analyzed		Version	
Reproduction		Comparison		17-4826-1760		17-4826-1760	03 Apr-08 1:30 PM		CETISv1.1.2	
Method		Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units		ChV	PMSD
Equal Variance t Two-Sample		C > T	Untransformed		0	>0	N/A		N/A	40.02%
Group Comparisons										
Control	vs	Control	Statistic	Critical	P-Value	MSD		Decision(0.05)		
Lab Water		Receiving Water/Effl	-11.03	1.73406	1.0000	2.20104		Non-Significant Effect		
ANOVA Table										
Source		Sum of Squares		Mean Square	DF	F Statistic		P-Value		Decision(0.05)
Between		980		980	1	121.66		0.00000		Significant Effect
Error		145		8.055555	18					
Total		1125		988.05556	19					
ANOVA Assumptions										
Attribute		Test		Statistic	Critical	P-Value		Decision(0.01)		
Variances		Variance Ratio F		2.58025	6.54109	0.17414		Equal Variances		
Distribution		Shapiro-Wilk W		0.94017		0.24153		Normal Distribution		
Data Summary										
			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Water	10	5.5	4	11	2.12132				
0	Receiving Wat	10	19.5	13	24	3.40751				
Graphics										

CETIS Analysis Detail

Cladoceran Survival and Reproduction Test						Pacific EcoRisk		
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version		
7d Proportion Survived	Comparison		17-4826-1760	17-4826-1760	03 Apr-08 11:03 AM	CETISv1.1.2		
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Fisher Exact	C > T	Untransformed		100	>100	1	N/A	
Group Comparisons								
Control	vs	Conc-%	Statistic	P-Value	Decision(0.05)			
Lab Water		100	1.00000	1.00000	Non-Significant Effect			
Data Summary								
Conc-%	Control Type	Non-Responders	Responders	Total Observed				
0	Lab Water	0	10	10				
100		10	0	10				
Graphics								

CETIS Analysis Detail

Comparisons: Page 2 of 2
 Report Date: 03 Apr-08 1:31 PM
 Analysis: 05-5331-4533/27821

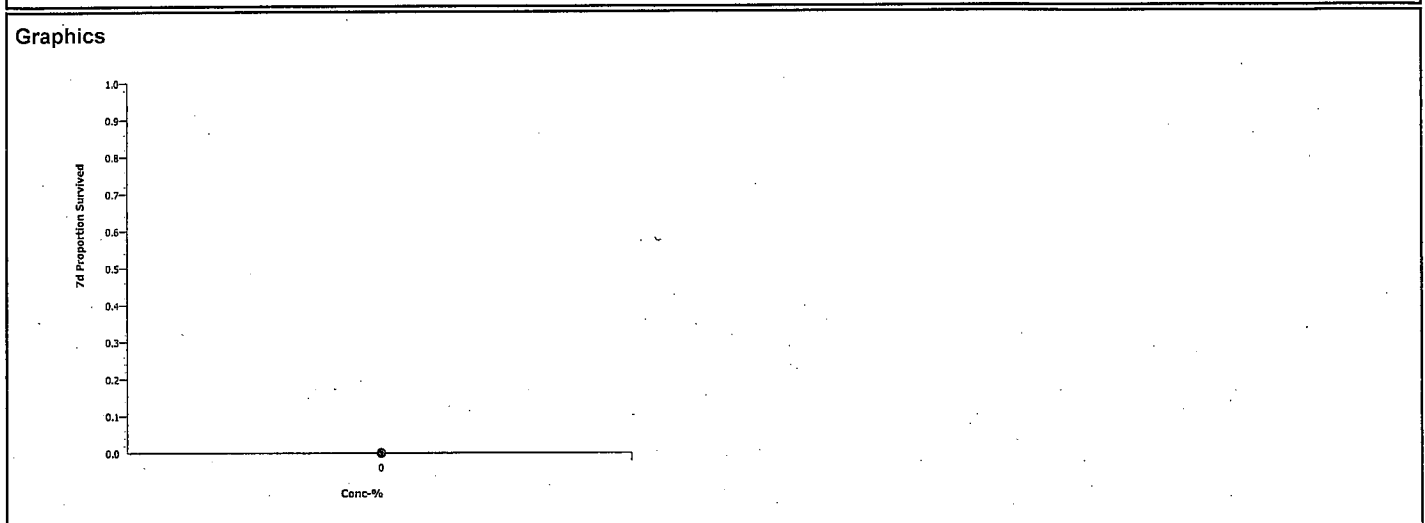
Cladoceran Survival and Reproduction Test Pacific EcoRisk

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	17-4826-1760	17-4826-1760	03 Apr-08 11:03 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Fisher Exact	C > T	Untransformed		0	>0	N/A	N/A	

Group Comparisons					
Control	vs	Control	Statistic	P-Value	Decision(0.05)
Lab Water		Receiving Water/Effl	1.00000	1.00000	Non-Significant Effect

Data Summary				
Conc-%	Control Type	Non-Responders	Responders	Total Observed
0	Lab Water	0	10	10
0	Receiving Wat	10	0	10



Short-Term Chronic 3-Brood *Ceriodaphnia dubia* Survival & Reproduction Test Data

Client: Precision Analytical Sample ID: 3-S-08 Test Date: 3-5-08
 Project #: 13054 Test ID: 27820 Control Water: Lab Water (80:20)

Day	pH		D.O.		Cond. (µS/cm)	Temp (°C)	Survival / Reproduction										SIGN-OFF
	New	Old	New	Old			A	B	C	D	E	F	G	H	I	J	
0	7.95		9.4		280	25.5	0	0	0	0	0	0	0	0	0	0	Date: 3-5-08 New WQ: 1840 Sol'n Prep: 1840 for CB Time: 1840
1	8.12	8.47	9.1	8.5	300	25.4	0	0	0	0	0	0	0	0	0	0	Date: 3-6-08 New WQ: 1840 for CB Sol'n Prep: 1840 Old WQ: 1840 Time: 1840
2	8.13	8.44	10.1	7.7	270	25.3	0	0	0	0	0	0	0	0	0	0	Date: 3-7-08 New WQ: 1840 Sol'n Prep: 1840 Old WQ: 1840 Time: 1840
3	8.06	8.30	9.0	6.7	244	25.2	0	0	0	0	0	0	0	0	0	0	Date: 3-8-08 New WQ: 1840 for CB Sol'n Prep: 1840 Old WQ: 1840 Time: 1840
4	8.23	8.33	9.9	8.3	275	25.6	3	4	5	5	5	4	3	4	4	3	Date: 3-9-08 New WQ: 1840 Sol'n Prep: 1840 Old WQ: 1840 Time: 1840
5	8.20	8.71	9.0	8.3	269	25.5	0	0	0	0	0	0	0	0	0	0	Date: 3-10-08 New WQ: 1840 Sol'n Prep: 1840 Old WQ: 1840 Time: 1840
6	7.96	8.04	10.5	7.3	289	25.5	8	9	11	9	10	9	10	10	12	11	Date: 3-11-08 New WQ: 1840 Sol'n Prep: 1840 Old WQ: 1840 Time: 1840
7	-	7.86	-	8.2	320	25.5	12	14	7	5	0	6	9	10	8	7	Date: 3-12-08 New WQ: 1840 Sol'n Prep: 1840 Old WQ: 1840 Time: 1840
8																	Date: 3-13-08 New WQ: 1840 Sol'n Prep: 1840 Old WQ: 1840 Time: 1840
Total =							12	14	23	19	15	19	22	20	24	21	Mean Neonates/Female = 19.5
Day	pH		D.O.		Cond. (µS/cm)	Survival / Reproduction	Survival / Reproduction										
	New	Old	New	Old			A	B	C	D	E	F	G	H	I	J	
0	7.79		9.3		851		0	0	0	0	0	0	0	0	0	0	
1	8.18	8.45	9.2	8.4	872		0	0	0	0	0	0	0	0	0	0	
2	8.15	8.55	9.9	8.0	845		0	0	0	0	0	0	0	0	0	0	
3	8.11	8.37	9.1	6.8	848		0	0	0	0	0	0	0	0	0	0	
4	8.33	8.45	10.1	8.1	868		2	0	0	1	1	2	2	2	0	2	
5	8.17	8.74	9.2	7.0	852		0	0	0	0	0	0	0	0	0	0	
6	8.11	8.10	10.6	7.3	837		5	5	5	7	3	4	5	4	6	2	
7	-	8.39	-	7.0	876		13	13	12	14	11	13	16	15	16	13	
8																	
Total =							20	18	17	22	15	19	23	21	22	18	Mean Neonates/Female = 19.5

19.4

1.7

Short-Term Chronic 3-Brood *Ceriodaphnia dubia* Survival & Reproduction Test Data

Client: Precision Analytical Sample ID: EPE-001 Test Date: 3-5-08
 Project #: 13054 Test ID #: 27820 Control Water: Receiving Water

Day	pH		D.O.		Cond. (μ S/cm)	Temp (°C)	Survival / Reproduction										SIGN-OFF	
	New	Old	New	Old			A	B	C	D	E	F	G	H	I	J		
0	8.27		9.2		224	25.5	0	0	0	0	0	0	0	0	0	0	Date: 3/5/08 Time: 1840 Sol'n Prep: CB New WQ: 1840 Loading: DE	
1	8.50	8.32	9.2	8.9	307	25.4	0	0	0	0	0	0	0	0	0	0	Date: 3/6/08 Time: 1515 Sol'n Prep: CB New WQ: 1515 Old WQ: 41A Counts: DE	
2	8.31	8.15	9.8	8.3	218	25.3	0	0	0	0	0	0	0	0	0	0	Date: 3/7/08 Time: 1045 Sol'n Prep: CB New WQ: 1045 Old WQ: 41A Counts: DE	
3	8.05	7.85	8.7	6.6	230	25.2	0	0	0	0	0	0	0	0	0	0	Date: 3/8/08 Time: 1655 Sol'n Prep: CB New WQ: 1655 Old WQ: 41A Counts: DE	
4	8.13	8.01	9.5	7.1	225	25.6	5	6	6	6	4	5	3	4	4	4	Date: 3/10/08 Time: 1550 Sol'n Prep: CB New WQ: 1550 Old WQ: 41A Counts: DE	
5	8.23	8.51	8.1	7.6	215	25.5	7/0	7/0	7/0	2	7/0	0	0	7/0	7/6	0	Date: 3/10/08 Time: 1130 Sol'n Prep: CB New WQ: 1130 Old WQ: 41A Counts: DE	
6	7.98	7.47	9.3	8.4	225	25.5	-	-	-	7/3	-	7/0	7/3	-	-	7/0	Date: 3/11/08 Time: 1700 Sol'n Prep: CB New WQ: 1700 Old WQ: 41A Counts: DE	
7	-	-	-	-	-	25.5	-	-	-	-	-	-	-	-	-	-	Date: 3/12/08 Time: 1300 Sol'n Prep: CB New WQ: 1300 Old WQ: 41A Counts: DE	
8							-	-	-	-	-	-	-	-	-	-	Date: 3/12/08 Time: 1300 Sol'n Prep: CB New WQ: 1300 Old WQ: 41A Counts: DE	
Total =							7/5	7/6	7/6	7/11	7/4	7/5	7/6	7/4	7/4	7/4	X = 5.5	

Lab Control Water

Appendix F

Test Data and Summary of Statistics for the Reference Toxicant Evaluation of the *Ceriodaphnia dubia*

CETIS Test Summary

Report Date:

19 Feb-08 2:46 PM

Test Link:

08-1141-6140/27258

Cladoceran Survival and Reproduction Test

Pacific EcoRisk

Test No: 09-7153-5111	Test Type: Reproduction-Survival (7d)	Duration: 5d 17h
Start Date: 12 Feb-08 05:30 PM	Protocol: EPA/821/R-02-013 (2002)	Species: Ceriodaphnia dubia
Ending Date: 18 Feb-08 11:00 AM	Dil Water: Laboratory Water	Source: In-House Culture
Setup Date: 12 Feb-08 05:30 PM	Brine: Not Applicable	

Sample No: 12-4621-9399	Code: 12958	Client: Reference Toxicant
Sample Date: 12 Feb-08 05:30 PM	Material: Sodium chloride	Project:
Receive Date: 12 Feb-08 05:30 PM	Source: Reference Toxicant	
Sample Age: N/A (25 °C)	Station: In House	

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
15-2937-0581	6d Proportion Survived	1500	2000	1732.05	N/A	Fisher Exact/Bonferroni-Holm
16-6054-3586	Reproduction	500	1000	707.107	14.25%	Dunnett's Multiple Comparison

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-mg/L	95% LCL	95% UCL	Method
09-9028-2689	6d Proportion Survived	50	1842.185	1691.934	2005.778	Trimmed Spearman-Kärber
18-6883-8050	Reproduction	1	285.4546	22.58333	525.4167	Linear Interpolation
		5	507.4074	112.9167	638.1411	
		10	625.9259	225.8333	780.0752	
		15	744.4445	498.0769	952.8846	
		20	862.963	661.9048	1037.143	
		25	981.4815	790.1786	1091.595	
		40	1180.198	1072.727	1259.434	
		50	1306.931	1217.391	1392.473	

6d Proportion Survived Summary

Conc-mg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Water	10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
250		10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
500		10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
1000		10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
1500		10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
2000		10	0.30000	0.00000	1.00000	0.15275	0.48305	161.02%

Reproduction Summary

Conc-mg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Water	10	25.6	17	29	1.17568	3.71782	14.52%
250		10	25.5	17	30	1.20416	3.80789	14.93%
500		10	24.4	16	28	1.08730	3.43835	14.09%
1000		10	19	12	25	1.22020	3.85861	20.31%
1500		10	8.9	3	16	1.11006	3.51030	39.44%
2000		10	0	0	0	0	0	0.00%

CETIS Test Summary

Report Date:

19 Feb-08 2:46 PM

Test Link:

08-1141-6140/27258

6d Proportion Survived Detail

Conc-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
250		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
500		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
1000		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
1500		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
2000		0.00000	1.00000	0.00000	0.00000	1.00000	0.00000	0.00000	1.00000	0.00000	0.00000

Reproduction Detail

Conc-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	24	27	29	27	28	29	17	27	22	26
250		22	27	30	26	28	29	17	25	24	27
500		24	26	25	24	27	28	16	22	25	27
1000		21	23	19	22	25	18	12	18	16	16
1500		10	6	7	3	9	12	8	8	10	16
2000		0	0	0	0	0	0	0	0	0	0

Short-Term Chronic 3-Brood *Ceriodaphnia dubia* Survival & Reproduction Test Data

Client: Reference Toxicant: Material: Sodium Chloride Test Date: 2/12/08

Project #: 12958 Test ID #: 22254 Control Water / Diluent: Lab Water (80:20)

Day	pH		D.O.		Cond. (μ S/cm)	Temp (°C)	Survival / Reproduction										SIGN-OFF
	New	Old	New	Old			A	B	C	D	E	F	G	H	I	J	
0	8.05		9.2		213	25.1	0	0	0	0	0	0	0	0	0	0	Date: 2/12/08 Time: 1730 Sol'n Prep: MY New WQ: 3B Test Loading: MY
1	8.11	8.28	9.0	9.1	222	25.1	0	0	0	0	0	0	0	0	0	0	Date: 2/13/08 Time: 1500 Sol'n Prep: MY New WQ: 3B Old WQ: HTA Counts: PC
2	8.06	8.08	9.0	10.8	224	25.1	0	0	0	0	0	0	0	0	0	0	Date: 2/14/08 Time: 1145 Sol'n Prep: MY New WQ: 3B Old WQ: HTA Counts: PC
3	8.20	8.17	8.7	7.6	226	25.6	4	0	5	0	4	4	1	5	5	0	Date: 2/15/08 Time: 1600 Sol'n Prep: MY New WQ: HTA Old WQ: HTA Counts: PC
4	8.60	8.22	11.7	8.4	254	25.8	0	7	0	6	0	13	5	10	0	6	Date: 2/16/08 Time: 1650 Sol'n Prep: MY New WQ: HTA Old WQ: HTA Counts: PC
5	8.54	8.62	8.9	8.7	224	25.5	9	11	12	11	13	0	11	0	8	8	Date: 2/17/08 Time: 1300 Sol'n Prep: MY New WQ: 3B Old WQ: KZ Counts: PC
6	8.04	8.21	8.2	8.4	214	25.8	11	9	12	10	11	12	0	12	9	12	Date: 2/18/08 Time: 1100 Sol'n Prep: MY New WQ: 3B Old WQ: CS Counts: PC
7																	Date: 2/19/08 Time: 1100 Sol'n Prep: MY New WQ: 3B Old WQ: CS Counts: PC
8																	Date: 2/20/08 Time: 1100 Sol'n Prep: MY New WQ: 3B Old WQ: CS Counts: PC
Total =							24	27	29	27	28	29	17	27	24	26	X = 0423-2 25.6
Day	pH		D.O.		Cond. (μ S/cm)	Temp (°C)	Survival / Reproduction										SIGN-OFF
	New	Old	New	Old			A	B	C	D	E	F	G	H	I	J	
0	8.05		8.9		724		0	0	0	0	0	0	0	0	0	0	
1	8.13	8.21	9.0	8.2	703		0	0	0	0	0	0	0	0	0	0	
2	8.12	8.18	9.1	10.5	716		0	0	0	0	0	0	0	0	0	0	
3	8.24	8.26	8.5	8.0	724		4	0	6	0	4	4	0	5	5	0	
4	8.45	8.29	11.6	8.4	715		0	6	0	5	0	12	7	8	0	6	
5	8.39	8.50	8.7	8.1	718		10	10	11	9	11	0	10	0	10	9	
6	8.08	8.20	9.4	8.3	715		8	11	13	12	13	13	0	12	9	12	
7																	
8																	
Total =							22	27	30	26	28	29	17	25	24	27	X = 25.5

Short-Term Chronic 3-Brood *Ceriodaphnia dubia* Survival & Reproduction Test Data

Client: Reference Toxicant Material: Sodium Chloride Test Date: 2/12/08

Project #: 12958 Test ID #: 20158 Control Water / Diluent: Lab Water (80:20)

500 mg/L																
Day	pH		D.O.		Cond. (µS/cm)	Survival / Reproduction										X =
	New	Old	New	Old		A	B	C	D	E	F	G	H	I	J	
0	8.02		9.1		1172	0	0	0	0	0	0	0	0	0	0	
1	8.13	8.21	9.0	7.5	1185	0	0	0	0	0	0	0	0	0	0	
2	8.13	8.20	9.2	10.5	1192	0	0	0	0	0	0	0	0	0	0	
3	8.24	8.27	8.5	7.7	1209	5	4	5	0	5	4	0	4	4	6	
4	8.36	8.24	11.8	8.6	1145	0	0	0	5	11	11	7	9	0	0	
5	8.37	8.44	9.0	8.3	1192	8	10	10	8	0	0	9	0	9	9	
6	8.07	8.21	9.0	8.1	1178	11	12	10	11	11	13	0	9	12	12	
7																
8																
Total =						24	26	25	24	27	28	16	22	25	27	
24.4																

1000 mg/L																
Day	pH		D.O.		Cond. (µS/cm)	Survival / Reproduction										X =
	New	Old	New	Old		A	B	C	D	E	F	G	H	I	J	
0	8.01		9.0		2059	0	0	0	0	0	0	0	0	0	0	
1	8.12	8.15	9.0	7.6	2132	0	0	0	0	0	0	0	0	0	0	
2	8.12	8.20	9.4	10.4	2154	0	0	0	0	0	0	0	0	0	0	
3	8.23	8.26	8.6	7.9	2113	0	0	0	0	5	1	4	3	0	3	
4	8.25	8.21	12.4	8.8	2125	4	0	0	5	0	9	0	7	1	0	
5	8.20	8.39	9.1	8.2	2138	7	11	8	9	8	0	8	0	7	6	
6	8.04	8.43	9.9	8.1	2155	10	12	11	8	12	8	0	8	8	7	
7																
8																
Total =						21	23	19	22	25	18	12	18	16	16	
24.0																

Short-Term Chronic 3-Brood *Ceriodaphnia dubia* Survival & Reproduction Test Data

Client: _____ Reference Toxicant: _____ Material: Sodium Chloride Test Date: 2/12/08

Project #: 12958 Test ID #: 27257 Control Water / Diluent: Lab Water (80:20)

Day	pH		D.O.		Cond. (μ S/cm)	Survival / Reproduction										X =
	New	Old	New	Old		A	B	C	D	E	F	G	H	I	J	
0	7.99		9.0		3040	0	0	0	0	0	0	0	0	0	0	
1	8.09	8.11	9.0	7.7	3110	0	0	0	0	0	0	0	0	0	0	
2	8.10	8.19	9.6	10.5	3110	0	0	0	0	0	0	0	0	0	0	
3	8.21	8.19	8.6	7.8	3070	0	0	0	0	4	3	0	0	0	0	
4	8.14	8.19	12.4	8.7	3060	0	0	2	0	0	3	0	5	1	2	
5	8.21	8.37	9.4	8.0	3080	6	0	5	0	2	0	4	0	3	8	
6	7.98	8.12	10.0	8.0	3120	4	6	0	3	3	6	4	3	6	6	
7																
8																
Total =						10	6	7	3	9	12	8	8	10	16	8.9

Day	pH		D.O.		Cond. (μ S/cm)	Survival / Reproduction										X =
	New	Old	New	Old		A	B	C	D	E	F	G	H	I	J	
0	7.98		9.1		3930	0	0	0	0	0	0	0	0	0	0	
1	8.08	8.09	9.1	7.7	4020	0	0	X/0	0	0	0	0	0	0	0	
2	8.09	8.16	10.1	10.2	4000	0	0	-	X/0	0	X/0	X/0	0	X/0	X/0	
3	8.18	8.16	8.8	7.6	4010	X/0	0	-	-	0	-	-	0	-	-	
4	8.10	8.12	12.4	8.7	3950	-	0	-	-	0	-	-	0	-	-	
5	8.18	8.23	9.6	8.1	3980	-	0	-	-	0	-	-	0	-	-	
6	7.92	8.10	10.4	8.0	4010	-	0	-	-	0	-	-	0	-	-	
7						-		-	-		-	-		-	-	
8						-		-	-		-	-		-	-	
Total =						4/0	0	7/0	4/0	0	4/0	4/0	0	4/0	4/0	0

CETIS Test Summary

Report Date:

21 Mar-08 2:31 PM

Test Link:

12-5784-5226/27893

Cladoceran Survival and Reproduction Test

Pacific EcoRisk

Test No:	16-3498-5251	Test Type:	Reproduction-Survival (7d)	Duration:	6d 15h
Start Date:	11 Mar-08 05:30 PM	Protocol:	EPA/821/R-02-013 (2002)	Species:	Ceriodaphnia dubia
Ending Date:	18 Mar-08 09:00 AM	Dil Water:	Laboratory Water.	Source:	In-House Culture
Setup Date:	11 Mar-08 05:30 PM	Brine:	Not Applicable		

Sample No:	07-2897-2190	Code:	13072	Client:	Reference Toxicant
Sample Date:	11 Mar-08 05:30 PM	Material:	Sodium chloride	Project:	
Receive Date:	11 Mar-08 05:30 PM	Source:	Reference Toxicant		
Sample Age:	N/A (25.7 °C)	Station:	In House		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
08-9972-6768	7d Proportion Survived	1500	2000	1732.05	N/A	Fisher Exact/Bonferroni-Holm
10-9767-2891	Reproduction	500	1000	707.107	28.34%	Steel Many-One Rank

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-mg/L	95% LCL	95% UCL	Method
14-7627-3450	7d Proportion Survived	50	1732.051	1581.436	1897.01	Trimmed Spearman-Kärber
04-7124-5636	Reproduction	1	529.3204	11.38095	644.1667	Linear Interpolation
		5	646.6019	56.90476	1023.246	
		10	793.2039	113.8095	1092.5	
		15	939.8058	170.7143	1155.838	
		20	1044.949	227.619	1207.917	
		25	1121.212	616.6667	1272.26	
		40	1350	1091.139	1511.927	
		50	1501.65	1273.81	1593.272	

7d Proportion Survived Summary

Conc-mg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Water	10	0.80000	0.00000	1.00000	0.13333	0.42164	52.70%
250		10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
500		10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
1000		10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
1500		10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
2000		10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

Reproduction Summary

Conc-mg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Water	10	20	0	27	3.37968	10.6875	53.44%
250		10	19.6	15	27	1.60693	5.08156	25.93%
500		10	20.8	16	25	0.98658	3.11983	15.00%
1000		10	16.7	12	19	0.83066	2.62679	15.73%
1500		10	10.1	6	14	0.76667	2.42441	24.00%
2000		10	0	0	0	0	0	0.00%

mb

QR

CETIS Test Summary

Report Date:

21 Mar-08 2:31 PM

Test Link:

12-5784-5226/27893

7d Proportion Survived Detail											
Conc-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	1.00000	0.00000	1.00000	1.00000	0.00000	1.00000	1.00000	1.00000	1.00000	1.00000
250		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
500		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
1000		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
1500		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
2000		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Reproduction Detail											
Conc-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	25	0	26	27	0	24	21	24	26	27
250		17	20	27	15	16	26	27	17	16	15
500		16	23	19	18	20	21	18	23	25	25
1000		12	16	13	15	18	19	19	17	19	19
1500		9	6	8	8	10	13	11	14	11	11
2000		0	0	0	0	0	0	0	0	0	0

Short-Term Chronic 3-Brood *Ceriodaphnia dubia* Survival & Reproduction Test Data

Client: Reference Toxicant Material: Sodium Chloride

Test Date: 3/11/08

Project #: 13072

Test ID #: 27893

Control Water / Diluent:

Lab Water (80:20)

Day	pH		D.O.		Cond. (µS/cm)	Temp (°C)	Survival / Reproduction										SIGN-OFF
	New	Old	New	Old			A	B	C	D	E	F	G	H	I	J	
0	8.15		9.2		2300	25.7	0	0	0	0	0	0	0	0	0	0	Date: 3-11-08 Time: 17:30 Sol'n Prep: BB New WQ: BB Old WQ: BB Counts: 50/05
1	8.34	8.24	9.0	8.1	247	25.6	0	0	0	0	0	0	0	0	0	0	Date: 3-12-08 Time: 11:30 Sol'n Prep: BB New WQ: BB Old WQ: BB Counts: 0
2	8.28	8.27	9.4	8.0	222	25.4	0	x/0	0	0	0	0	0	0	0	0	Date: 3-13-08 Time: 10:15 Sol'n Prep: BB New WQ: BB Old WQ: BB Counts: 0
3	8.27	8.22	8.9	7.9	230	25.4	0	-	0	0	0	0	0	0	0	0	Date: 3-14-08 Time: 12:15 Sol'n Prep: BB New WQ: BB Old WQ: BB Counts: 0
4	8.36	8.70	9.3	8.7	228	25.3	3	-	4	4	-	4	5	4	5	4	Date: 3-15-08 Time: 12:21 Sol'n Prep: BB New WQ: BB Old WQ: BB Counts: 0
5	8.06	7.91	9.5	7.9	223	25.3	0	-	0	0	-	0	6	7	0	0	Date: 3-16-08 Time: 11:36 Sol'n Prep: BB New WQ: BB Old WQ: BB Counts: 0
6	8.30	8.23	9.4	8.8	225	25.1	11	-	12	11	-	9	0	0	9	10	Date: 3-17-08 Time: 12:30 Sol'n Prep: BB New WQ: BB Old WQ: BB Counts: 0
7	-	8.101	-	8.40	227	25.2	11	-	10	12	-	11	10	13	12	13	Date: 3-18-08 Time: 11:36 Sol'n Prep: BB New WQ: BB Old WQ: BB Counts: 0
8																	Date: 3-19-08 Time: 11:36 Sol'n Prep: BB New WQ: BB Old WQ: BB Counts: 0
Total =							25	x/0	26	27	x/0	24	21	24	26	27	X = 20.0
Day	pH		D.O.		Cond. (µS/cm)	Temp (°C)	Survival / Reproduction										SIGN-OFF
	New	Old	New	Old			A	B	C	D	E	F	G	H	I	J	
0	8.11		8.9		737		0	0	0	0	0	0	0	0	0	0	
1	8.23	8.20	9.1	8.1	725		0	0	0	0	0	0	0	0	0	0	
2	8.24	8.27	9.2	8.1	730		0	0	0	0	0	0	0	0	0	0	
3	8.27	8.33	8.9	8.0	736		0	0	0	0	0	0	0	0	0	0	
4	8.36	8.57	9.1	8.4	725		3	2	5	5	4	5	4	4	7	5	
5	8.12	8.09	9.7	8.0	690		0	1	9	2	6	8	10	0	5	3	
6	8.31	8.21	9.4	8.2	657		7	8	0	8	6	0	0	0	4	0	
7	-	8.15	-	8.2	718		7	9	13	12*	10*	13	13	13	11*	7	
8																	
Total =							17	20	27	15	16	26	27	17	16	15	X = 19.6

* 4th brood excluded

Short-Term Chronic 3-Brood *Ceriodaphnia dubia* Survival & Reproduction Test Data

Client: Reference Toxicant

Material: Sodium Chloride

Test Date: 3/11/08

Project #: 13072

Test ID #: 27893

Control Water / Diluent:

Lab Water (80:20)

500 mg/L						Survival / Reproduction												X = 20.8	
Day	pH		D.O.		Cond. (μ S/cm)	A	B	C	D	E	F	G	H	I	J				
	New	Old	New	Old															
0	8.05		9.0		1188	0	0	0	0	0	0	0	0	0	0				
1	8.10	8.17	9.2	7.9	1223	0	0	0	0	0	0	0	0	0	0				
2	8.21	8.24	9.3	8.0	1224	0	0	0	0	0	0	0	0	0	0				
3	8.28	8.31	9.1	7.9	1236	0	0	0	0	0	0	0	0	0	0				
4	8.33	8.54	9.2	8.2	1206	2	4	4	4	5	5	5	4	5	5				
5	8.14	8.16	9.8	8.0	1138	1	0	6	6	0	7	5	8	1	9				
6	8.29	8.19	9.5	7.8	1155	7	10	0	0	7	0	0	0	8	0				
7	—	8.30	—	8.1	1244	6	9	9	8	8	9	8	11	11	11				
8																			
Total =						16	23	19	18	20	21	18	23	25	25				

1000 mg/L						Survival / Reproduction												X = 16.7	
Day	pH		D.O.		Cond. (μ S/cm)	A	B	C	D	E	F	G	H	I	J				
	New	Old	New	Old															
0	8.05		9.0		1188	0	0	0	0	0	0	0	0	0	0				
1	8.07	8.13	9.7	8.0	1200	0	0	0	0	0	0	0	0	0	0				
2	8.17	8.26	9.5	8.1	2122	0	0	0	0	0	0	0	0	0	0				
3	8.24	8.27	9.5	8.0	2110	0	0	0	0	0	0	0	0	0	0				
4	8.31	8.46	9.2	8.2	2096	0	3	3	4	4	4	3	4	4	3				
5	8.14	8.18	9.8	7.9	2052	1	0	4	4	6	6	7	6	0	1				
6	8.26	8.17	9.8	7.9	2073	5	5	6	0	7	0	0	0	7	6				
7	—	8.20	—	8.3	2059	6	8	6	7	7	9	9	7	8	9				
8																			
Total =						12	16	13	15	18	19	19	17	19	19				

Short-Term Chronic 3-Brood *Ceriodaphnia dubia* Survival & Reproduction Test Data

Client: _____
 Reference Toxicant _____
 Material: _____ Sodium Chloride
 Test Date: 3/11/08

Project #: 13072 Test ID #: 27893 Control Water / Diluent: Lab Water (80:20)

[illegible]

Appendix G

Test Data and Summary of Statistics for the Evaluation of the Chronic Toxicity of the Effluent to Fathead Minnows

CETIS Test Summary

Report Date:

03 Apr-08 10:42 AM

Test Link:

05-3756-6644/27823

Chronic Larval Fish Survival and Growth Test						Pacific EcoRisk		
Test No:	03-1980-4782	Test Type:	Growth-Survival (7d)	Duration:	6d 15h			
Start Date:	05 Mar-08 05:30 PM	Protocol:	EPA/821/R-02-013 (2002)	Species:	Pimephales promelas			
Ending Date:	12 Mar-08 09:15 AM	Dil Water:	Laboratory Water	Source:	Aquatic Biosystems, CO			
Setup Date:	05 Mar-08 05:30 PM	Brine:	Not Applicable					
Sample No:	02-8216-0966	Code:	13054	Client:	Precision Analytical			
Sample Date:	04 Mar-08 11:20 AM	Material:	Effluent	Project:	NPDES			
Receive Date:	05 Mar-08 11:00 AM	Source:	Precision Analytical					
Sample Age:	30h (19.7 °C)	Station:	EFF-001					
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method		
04-3024-1738	7d Proportion Survived	0	>0	N/A	8.82%	Equal Variance t Two-Sample		
08-6628-7287		<100	100	N/A	14.26%	Equal Variance t Two-Sample		
02-0717-3304	Mean Dry Biomass-mg	<0	0	N/A	7.28%	Equal Variance t Two-Sample		
07-9677-6942		<100	100	N/A	8.78%	Equal Variance t Two-Sample		
7d Proportion Survived Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Water	4	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
0	Receiving Wat	4	0.92500	0.80000	1.00000	0.04787	0.09574	10.35%
100		4	0.62500	0.40000	0.90000	0.10308	0.20616	32.98%
Mean Dry Biomass-mg Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Water	4	0.51575	0.48500	0.54600	0.01278	0.02555	4.95%
0	Receiving Wat	4	0.47275	0.44200	0.49800	0.01450	0.02900	6.13%
100		4	0.08025	0.03100	0.12000	0.01950	0.03900	48.60%
7d Proportion Survived Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4			
0	Lab Water	1.00000	1.00000	1.00000	1.00000			
0	Receiving Wat	0.90000	0.80000	1.00000	1.00000			
100		0.60000	0.60000	0.90000	0.40000			
Mean Dry Biomass-mg Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4			
0	Lab Water	0.54600	0.52300	0.50900	0.48500			
0	Receiving Wat	0.49800	0.44200	0.45400	0.49700			
100		0.12000	0.10100	0.03100	0.06900			

CETIS Analysis Detail

Comparisons: Page 1 of 4
 Report Date: 03 Apr-08 10:42 AM
 Analysis: 08-6628-7287/27823

Chronic Larval Fish Survival and Growth Test						Pacific EcoRisk
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	05-3756-6644	05-3756-6644	03 Apr-08 10:41 AM	CETISv1.1.2

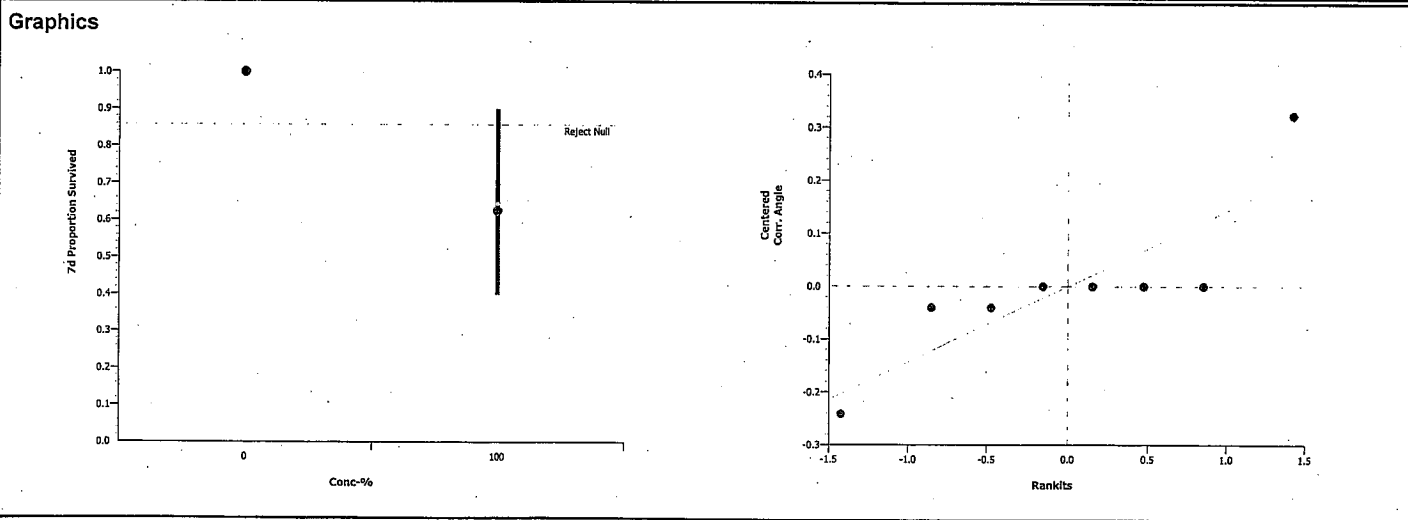
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		<100	100		N/A	14.26%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Lab Water		100	4.13114	1.94318	0.0031	0.22838	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.471491	0.471491	1	17.07	0.00614	Significant Effect
Error	0.1657617	0.027627	6			
Total	0.63725275	0.499118	7			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Modified Levene	2.57726	13.74502	0.15953	Equal Variances
Distribution	Shapiro-Wilk W	0.78753		0.02102	Normal Distribution

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Water	4	1.00000	1.00000	1.00000	0.00000	1.41202	1.41202	1.41202	0.00027
100		4	0.62500	0.40000	0.90000	0.20616	0.92648	0.68472	1.24905	0.23506



CETIS Analysis Detail

Comparisons: Page 2 of 4
 Report Date: 03 Apr-08 10:42 AM
 Analysis: 04-3024-1738/27823

Chronic Larval Fish Survival and Growth Test Pacific EcoRisk

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	05-3756-6644	05-3756-6644	03 Apr-08 10:41 AM	CETISv1.1.2

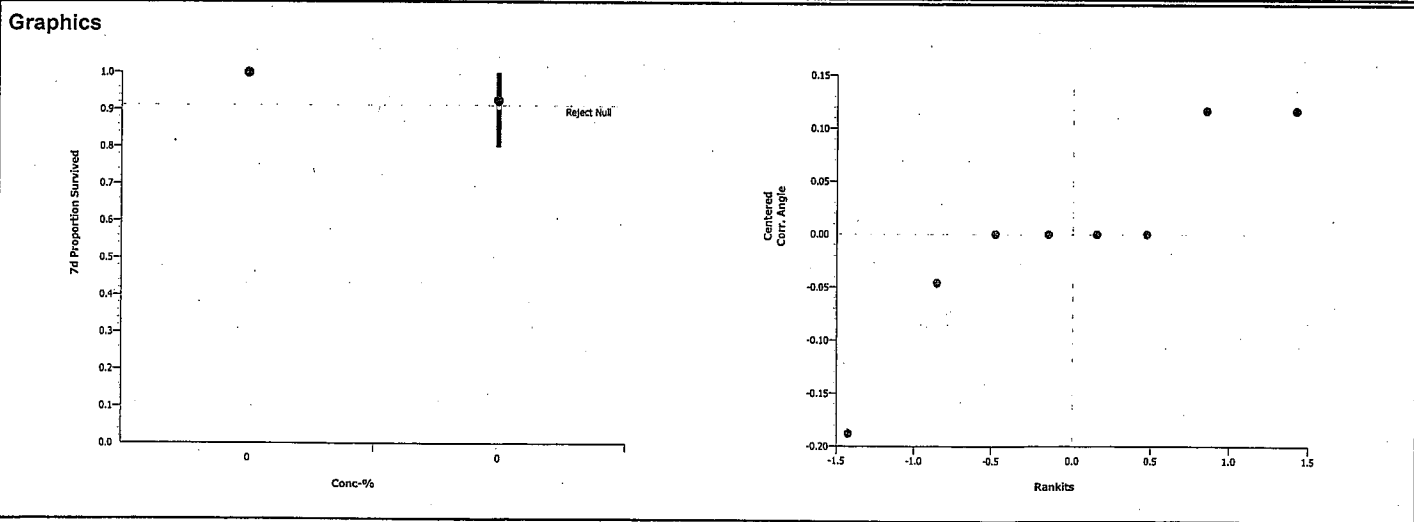
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		0	>0	N/A	N/A	8.82%

Group Comparisons							
Control	vs	Control	Statistic	Critical	P-Value	MSD	Decision(0.05)
Lab Water		Receiving Water	1.5918	1.94318	0.0813	0.14278	Non-Significant Effect

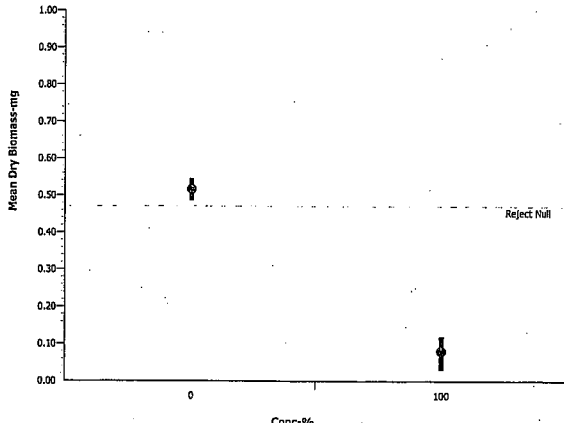
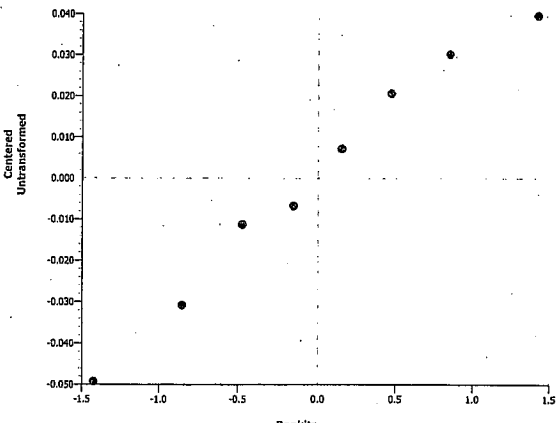
ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0273590	0.0273590	1	2.53	0.16254	Non-Significant Effect
Error	0.0647854	0.0107976	6			
Total	0.09214444	0.0381566	7			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Modified Levene	10.87036	13.74502	0.01647	Equal Variances
Distribution	Shapiro-Wilk W	0.85978		0.11948	Normal Distribution

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Water	4	1.00000	1.00000	1.00000	0.00000	1.41202	1.41202	1.41202	0.00027
0	Receiving Wat	4	0.92500	0.80000	1.00000	0.09574	1.29506	1.10715	1.41202	0.14695



CETIS Analysis Detail

Chronic Larval Fish Survival and Growth Test							Pacific EcoRisk															
Endpoint		Analysis Type		Sample Link		Control Link		Date Analyzed		Version												
Mean Dry Biomass-mg		Comparison		05-3756-6644		05-3756-6644		03 Apr-08 10:41 AM		CETISv1.1.2												
Method		Alt H		Data Transform		Zeta		NOEL		LOEL		Toxic Units		ChV		PMSD						
Equal Variance t Two-Sample		C > T		Untransformed				<100		100				N/A		8.78%						
Group Comparisons																						
Control		vs		Conc-%		Statistic		Critical		P-Value		MSD		Decision(0.05)								
Lab Water				100		18.6811		1.94318		0.0000		0.04530		Significant Effect								
ANOVA Table																						
Source		Sum of Squares		Mean Square		DF		F Statistic		P-Value		Decision(0.05)										
Between		0.3793204		0.3793204		1		348.98		0.00000		Significant Effect										
Error		0.0065216		0.0010869		6																
Total		0.38584201		0.3804074		7																
ANOVA Assumptions																						
Attribute		Test		Statistic		Critical		P-Value		Decision(0.01)												
Variances		Variance Ratio F		2.32929		47.46723		0.50548		Equal Variances												
Distribution		Shapiro-Wilk W		0.97009				0.89874		Normal Distribution												
Data Summary																						
Conc-%			Control Type		Count		Original Data					Transformed Data										
							Mean		Minimum		Maximum		SD		Mean		Minimum		Maximum		SD	
0			Lab Water		4		0.51575		0.48500		0.54600		0.02555									
100					4		0.08025		0.03100		0.12000		0.03900									
Graphics																						
																						

CETIS Analysis Detail

Comparisons: Page 4 of 4
 Report Date: 03 Apr-08 10:42 AM
 Analysis: 02-0717-3304/27823

Chronic Larval Fish Survival and Growth Test						Pacific EcoRisk
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Comparison	05-3756-6644	05-3756-6644	03 Apr-08 10:42 AM	CETISv1.1.2

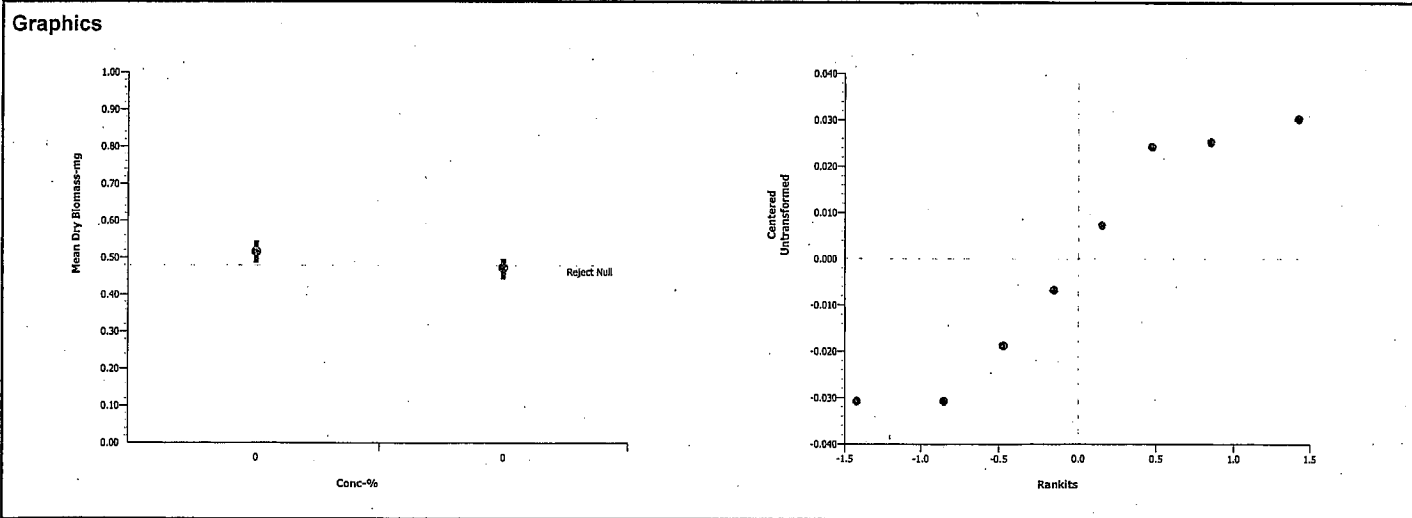
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<0	0		N/A	7.28%

Group Comparisons							
Control	vs	Control	Statistic	Critical	P-Value	MSD	Decision(0.05)
Lab Water		Receiving Water	2.22504	1.94318	0.0339	0.03755	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.003698	0.003698	1	4.95	0.06773	Non-Significant Effect
Error	0.0044817	0.0007469	6			
Total	0.00817963	0.0044449	7			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.28791	47.46723	0.84020	Equal Variances
Distribution	Shapiro-Wilk W	0.88402		0.20566	Normal Distribution

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Water	4	0.51575	0.48500	0.54600	0.02555				
0	Receiving Wat	4	0.47275	0.44200	0.49800	0.02900				



7 Day Chronic Fathead Minnow Toxicity Test Data

Client: Precision Analytical
 Test Material: EFF + RW
 Test ID#: 27823 Project #: 13054
 Test Date: 3-5-08 Randomization: —

Organism Log#: 3788 Age: <48hrs
 Organism Supplier: ABS
 Control/Diluent: EPAMH
 Control Water Batch: 1082

Treatment	Temp (°C)	pH		D.O. (mg/L)		Conductivity (µs/cm)	# Live Organisms				SIGN-OFF
		new	old	new	old		A	B	C	D	
Lab Water Control	25.4	8.58	8.26	8.2	10.0	21294	10	10	10	10	Date: 3-5-08
Receiving Water	25.4	8.27	8.02	8.3	9.5	24625	10	10	10	10	Sample ID: 19157
100%	25.4	8.65	8.8	8.6	9.4	284852	10	10	10	10	Test Solution Prep: WFOCB
											New WQ: N/A
											Initiation Time: 1730
Meter ID	7A	PH12	PH12	DO12	DO12	EC04					Initiation Signoff: DP
Lab Water Control	25.5	8.27	8.78	9.7	7.6	673	10	10	10	10	Date: 3-6-08
Receiving Water	25.5	8.08	8.39	9.8	7.8	281	10	10	10	10	Sample ID: 19157
100%	25.5	8.31	8.39	9.8	8.2	EC03	10	10	10	10	Test Solution Prep: tower
											New WQ: BB
											Renewal Time: 1200
											Renewal Signoff: DE
Meter ID	7A	PH11	PH03	DO10	DO14	EC03					Old WQ: HTA
Lab Water Control	25.1	8.23	7.92	9.5	7.5	294	10	10	10	10	Date: 3/7/08
Receiving Water	25.1	8.14	8.19	9.8	7.8	266	10	10	10	9	Sample ID: 19157
100%	25.1	8.08	8.55	9.9	7.6	853	10	10	10	9	Test Solution Prep: W
											New WQ: sub
											Renewal Time: 1200
											Renewal Signoff: WTR DC
Meter ID	7A	PH12	PH12	DO10	DO10	EC04					Old WQ: sub
Lab Water Control	25.1	8.09	8.26	8.8	7.8	295	10	10	10	10	Date: 3/8/08
Receiving Water	25.1	8.05	8.51	9.8	7.8	261	10	10	10	10	Sample ID: 19157
100%	25.1	8.05	8.51	9.8	7.6	839	10	10	10	9	Test Solution Prep: JS
											New WQ: HN
											Renewal Time: 12:24
											Renewal Signoff: RP
Meter ID	7A	PH11	PH11	DO10	DO10	EC01					Old WQ: HN

7 Day Chronic Fathead Minnow Toxicity Test Data

Client: Precision Analytical
 Test Material: EFF + CW
 Test ID#: 27823 Project #: 13054
 Test Date: 3-5-08 Randomization: -

Organism Log#: 3788 Age: 4 wgs
 Organism Supplier: ABS
 Control/Diluent: EPAMH
 Control Water Batch: 1083

Treatment	Temp (°C)	pH		D.O. (mg/L)		Conductivity (µs/cm)	# Live Organisms				SIGN-OFF
		new	old	new	old		A	B	C	D	
Lab Water Control	25.4	8.28	7.90	9.4	6.8	3430	10	10	10	10	Date: 3-9-08
Receiving Water	25.4	8.40	8.07	10.2	7.0	298	9	10	10	10	Sample ID: 19157
100%	25.4	8.13	8.05	10.8	7.2	854	10	8	10	9	Test Solution Prep: NR
											New WQ: SB
											Renewal Time: 1230
											Renewal Signoff: W for DC
Meter ID	7A	PH03	PH11	DO12	DO10	EC04					Old WQ: HM
Lab Water Control	25.5	8.00	8.58	5.8	7.1	294	10	10	10	10	Date: 3/10/08
Receiving Water	25.5	8.09	8.31	7.0	7.2	262	9	8	10	10	Sample ID: 19158
100%	25.5	8.33	8.59	8.9	7.3	825	9	7	10	6	Test Solution Prep: RV
											New WQ: W for DC
											Renewal Time: 1430
											Renewal Signoff: RV
Meter ID	7A	PH12	PH03	DO14	DO14	EC04					Old WQ: HTA
Lab Water Control	25.3	NA	8.58	NA	8.2	311	10	10	10	10	Date: 3/11/08
Receiving Water	25.3	NA	8.37	NA	8.3	296	9	8	10	10	Sample ID: NA
100%	25.3	NA	8.65	NA	8.6	884	9	6	9	5	Test Solution Prep: -
											New WQ: +
											Renewal Time: 10:00
											Renewal Signoff: RV
Meter ID	7A	NA	PH12	NA	DO10	EC0					Old WQ: AS
Lab Water Control	25.0		8.10		7.3	318	10	10	10	10	Termination Date: 3/12/08
Receiving Water	25.0		7.90		7.0	293	9	8	10	10	Termination Time: 0915
100%	25.0		8.31		7.0	928	8	6	9	4	Termination Signoff: JT
											Old WQ: BB
Meter ID	7A		PH11		DO14	EC04					

Fathead Minnow Dry Weight Data Sheet

Client: Precision Analytical Test ID #: 27823 Project #: 13054
 Sample: Eff + RW Tare Weight Date: 3-11-08 Sign-off: Me
 Test Date: 3/15/08 Final Weight Date: 3-13-08 Sign-off: Me

Pan	Concentration	Replicate	Initial Pan Weight (mg)	Final Pan Weight (mg)	Initial # of Organisms	Biomass Value (mg)
1	Control	A	134.53	139.99	10	0.546
2		B	154.49	159.72	10	0.523
3		C	143.36	148.45	10	0.509
4		D	146.33	151.18	10	0.485
5	RW	A	118.09	123.07	10	0.498
6		B	147.05	151.47	10	0.442
7		C	136.38	140.92	10	0.546 0.454
8		D	120.72	125.69	10	0.497
9	100%	A	141.50	142.70	10	0.120
10		B	146.63	147.64	10	0.101
11		C	143.27	143.58	10	0.031
12		D	140.76	141.45	10	0.069
QA 1			118.02	118.02	-	0.00
QA2			144.25	144.22	-	-0.03
Balance ID			1	1		

Appendix H

Test Data and Summary of Statistics for the Reference Toxicant Evaluation of the Fathead Minnows

CETIS Test Summary

Report Date:

19 Mar-08 1:15 PM

Test Link:

12-1966-3738/27816

Chronic Larval Fish Survival and Growth Test Pacific EcoRisk

Test No:	05-6085-4856	Test Type:	Growth-Survival (7d)	Duration:	6d 16h
Start Date:	05 Mar-08 06:00 PM	Protocol:	EPA/821/R-02-013 (2002)	Species:	Pimephales promelas
Ending Date:	12 Mar-08 10:45 AM	Dil Water:	Not Applicable	Source:	Aquatic Biosystems, CO
Setup Date:	05 Mar-08 06:00 PM	Brine:	Not Applicable		

Sample No:	08-2813-9422	Code:	13059	Client:	
Sample Date:	05 Mar-08 06:00 PM	Material:	Copper sulfate	Project:	
Receive Date:	05 Mar-08 06:00 PM	Source:	Reference Toxicant		
Sample Age:	N/A (25.8 °C)	Station:	In House		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
16-6694-8479	7d Proportion Survived	12.5	25	17.6777	7.35%	Steel Many-One Rank
17-2495-7769	Mean Dry Biomass-mg	12.5	25	17.6777	9.70%	Dunnett's Multiple Comparison

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
11-0064-8283	7d Proportion Survived	1	8.819875	N/A	N/A	Linear Regression
		5	10.82174	N/A	N/A	
		10	12.06853	N/A	N/A	
		15	12.98991	N/A	N/A	
		20	13.77211	N/A	N/A	
		25	14.4806	N/A	N/A	
		40	16.43175	N/A	N/A	
06-6746-8544	Mean Dry Biomass-mg	1	6.955677	N/A	9.90607	Linear Interpolation
		5	9.778382	7.009964	14.66757	
		10	12.66273	9.327955	13.98016	
		15	13.37441	12.11425	14.6075	
		20	14.0861	12.9419	15.24804	
		25	14.79779	13.7378	15.92113	
		40	16.93285	16.05587	17.8896	
		50	18.35622	17.51128	19.11429	

7d Proportion Survived Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Water	4	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
6.25		4	0.97500	0.90000	1.00000	0.02500	0.05000	5.13%
12.5		4	0.97500	0.90000	1.00000	0.02500	0.05000	5.13%
25		4	0.07778	0.00000	0.11111	0.02606	0.05212	67.01%
50		4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%
100		4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

Mean Dry Biomass-mg Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Water	4	0.54075	0.53300	0.55700	0.00557	0.01115	2.06%
6.25		4	0.56575	0.50500	0.61900	0.02496	0.04993	8.83%
12.5		4	0.50425	0.47400	0.55000	0.01766	0.03531	7.00%
25		4	0.01839	0.00000	0.04100	0.00927	0.01853	100.79%
50		4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%
100		4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

CETIS Test Summary

Report Date:

19 Mar-08 1:15 PM

Test Link:

12-1966-3738/27816

7d Proportion Survived Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water	1.00000	1.00000	1.00000	1.00000
6.25		1.00000	1.00000	1.00000	0.90000
12.5		1.00000	1.00000	1.00000	0.90000
25		0.11111	0.10000	0.00000	0.10000
50		0.00000	0.00000	0.00000	0.00000
100		0.00000	0.00000	0.00000	0.00000

Mean Dry Biomass-mg Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water	0.53400	0.55700	0.53300	0.53900
6.25		0.61900	0.50500	0.54800	0.59100
12.5		0.47400	0.51400	0.55000	0.47900
25		0.02556	0.00700	0.00000	0.04100
50		0.00000	0.00000	0.00000	0.00000
100		0.00000	0.00000	0.00000	0.00000

7 Day Chronic Fathead Minnow Reference Toxicant Test Data

Client: Reference Toxicant
 Test Material: Copper Sulfate (µg/L)
 Test ID#: 27816 Project #: 13059
 Test Date: 3/5/08 Randomization: -

Organism Log#: 3788 Age: < 48hr
 Organism Supplier: ABS
 Control/Diluent: EPAMH
 Control Water Batch: 1083

Treatment	Temp (°C)	pH		D.O. (mg/L)		Conductivity (µs/cm)	# Live Organisms				SIGN-OFF
		New	Old	New	Old		A	B	C	D	
Control	25.8	8.33		9.4		304	10	10	10	10	Date: 3/5/08
6.25	25.8	8.29		9.4		306	10	10	10	10	Test Solution Prep: KO
12.5	25.8	8.24		9.4		305	10	10	10	10	New WQ: CCS
25	25.8	8.28		9.3		305	10 ⁹	10	10	10	Initiation Time: 1800
50	25.8	8.20		9.3		305	10	10	10	10	Initiation Signoff: QD
100	25.8	8.18		9.3		308	10	10	10	10	
Meter ID	7A	pH03		D010		EC03					
Control	25.3	7.96	8.07	9.4	7.9	305	10	10	10	10	Date: 3.6.08
6.25	25.3	7.84	7.95	9.3	7.9	303	10	10	10	10	Test Solution Prep: KO
12.5	25.3	7.99	7.91	9.4	8.0	302	10	10	10	9	New WQ: BB
25	25.3	8.00	7.89	9.3	7.9	302	2	3	1	7	Renewal Time: 11:15
50	25.3	8.00	7.87	9.3	7.8	302	1	2	3	6	Renewal Signoff: KO
100	25.3	7.97	7.85	9.4	7.9	303	0	0	0	0	Old WQ: BB
Meter ID	7A	PH11	PH11	D010	D010	EC03					
Control	25.2	7.74	8.45	9.8	8.2	295	10	10	10	10	Date: 3.7.08
6.25	25.2	7.85	8.35	9.5	7.8	292	10	10	10	10 ⁹	Test Solution Prep: CB
12.5	25.2	7.92	8.28	9.4	7.6	294	10	10	10	9	New WQ: mp
25	25.2	7.97	8.21	9.3	7.4	293	1	2	0	5 ⁸	Renewal Time: 1400
50	25.2	8.00	8.14	9.2	7.4	292	0	0	0	0	Renewal Signoff: SE
100	-	-	-	-	-	-	-	-	-	-	Old WQ: mp
Meter ID	7A	PH12	PH12	D010	D010	EC04					
Control	25.1	8.21	7.99	8.9	8.0	299	10	10	10	10	Date: 3/8/08
6.25	25.1	8.23	7.98	8.9	8.1	296	10	10	10	10	Test Solution Prep: JS
12.5	25.1	8.22	7.97	9.1	8.0	292	10	10	10	9	New WQ: JS
25	25.1	8.22	7.97	8.4	8.2	293	1	2	0	5	Renewal Time: 1045
50	-	-	-	-	-	-	-	-	-	-	Renewal Signoff: JJ
100	-	-	-	-	-	-	-	-	-	-	Old WQ: HH
Meter ID	7A	pH03	PH11	D012	D010	EC04					

7 Day Chronic Fathead Minnow Reference Toxicant Test Data

Client: Reference Toxicant
 Test Material: Copper Sulfate (µg/L)
 Test ID#: 27816 Project #: 13059
 Test Date: 3/5/08 Randomization: -

Organism Log#: 3788 Age: C 48hr
 Organism Supplier: AB S
 Control/Diluent: EPAMH
 Control Water Batch: 1083

Treatment	Temp (°C)	pH		D.O. (mg/L)		Conductivity (µs/cm)	# Live Organisms				SIGN-OFF
		new	old	new	old		A	B	C	D	
Control	25.4	8.27	7.77	8.6	7.5	292	10	10	10	10	Date: 3-9-08
6.25	25.4	8.22	7.71	8.7	7.2	293	10	10	10	9	Test Solution Prep: <i>RV</i>
12.5	25.4	8.19	7.72	8.7	7.9	295	10	10	10	9	New WQ: HN
25	25.4	8.17	7.73	8.6	7.7	292	1	1	-	3	Renewal Time: 11:25
50	-	-	-	-	-	-	-	-	-	-	Renewal Signoff: <i>RV</i>
100	-	-	-	-	-	-	-	-	-	-	Old WQ: HN
Meter ID	7A	PH11	PH12	DO10	DO10	EC01					
Control	25.4	8.04	7.86	8.8	7.3	294	10	10	10	10	Date: 3-10-08
6.25	25.4	8.07	7.82	8.8	7.3	295	10	10	10	9	Test Solution Prep: <i>RV</i>
12.5	25.4	8.08	7.85	8.9	7.5	296	10	10	10	9	New WQ: <i>RV</i>
25	25.4	8.08	7.87	8.6	7.7	296	1	1	-	2	Renewal Time: 12:09
50	-	-	-	-	-	-	-	-	-	-	Renewal Signoff: <i>RV</i>
100	-	-	-	-	-	-	-	-	-	-	Old WQ: <i>RV</i>
Meter ID	7A	PH12	PH12	DO10	DO10	EC04					
Control	25.2	8.45	8.12	9.1	8.2	310	10	10	10	10	Date: 3/11/08
6.25	25.2	8.32	8.06	9.1	8.2	296	10	10	10	9	Test Solution Prep: Ko
12.5	25.2	8.16	7.91	9.1	8.1	296	10	10	10	9	New WQ: BB
25	25.2	8.09	7.95	9.1	7.9	295	1	1	-	1	Renewal Time: 10:27
50	-	-	-	-	-	-	-	-	-	-	Renewal Signoff: <i>RV</i>
100	-	-	-	-	-	-	-	-	-	-	Old WQ: <i>RV</i>
Meter ID	7A	PH11	PH12	DO12	DO10	EC05					
Control	25.0		8.44		7.4	306	10	10	10	10	Date: 3/12/08
6.25	25.0		8.27		6.8	308	10	10	10	9	Termination Time: 1030
12.5	25.0		8.18		6.0	304	10	10	10	9	Termination Signoff: JJ
25	25.0		8.11		6.4	316	1	1	-	1	Old WQ: <i>YN</i>
50	-		-		-	-	-	-	-	-	
100	-		-		-	-	-	-	-	-	
Meter ID	7A		PH11		DO14	EC04					

Fathead Minnow Dry Weight Data Sheet

Client: Reference Toxicant Test ID #: 27816 Project #: 13059
 Sample: Copper Sulfate (µg/L) Tare Weight Date: 3-6-08 Sign-off: Me
 Test Date: 3/5/08 Final Weight Date: 3-12-08 Sign-off: Me

Pan ID	Concentration	Replicate	Initial Pan Weight (mg)	Final Pan Weight (mg)	Initial # of Organisms	Biomass Value (mg)
1	Control	A	116.56	121.90	10	0.534
2		B	115.87	121.44	10	0.557
3		C	93.05	98.38	10	0.533
4		D	108.17	113.56	10	0.539
5	6.25	A	116.65	122.84	10	0.619
6		B	127.68	132.73	10	0.505
7		C	120.35	125.83	10	0.548
8		D	129.81	135.72	10	0.591
9	12.5	A	118.41	123.15	10	0.474
10		B	123.104.38	109.52	10	0.574
11		C	86.94	92.44	10	0.550
12		D	109.06	113.85	10	0.479
13	25	A	103.47	103.70	10 mg 9	0.026
14		B	110.36	110.43	10	0.007
15		C	120.98	—	10	—
16		D	115.87	116.28	10	0.041
17	50	A	112.72	—	10	—
18		B	107.31	—	10	—
19		C	115.74	—	10	—
20		D	115.06	—	10	—
21	100	A	115.43	—	10	—
22		B	119.32	—	10	—
23		C	118.53	—	10	—
24		D	109.55	—	10	—
QA1			99.58	99.56		-0.02
QA2			104.38 123.45	123.42		-0.03
QA3			107.15			
Balance ID:			1	1		